

**EXPLORING THE ROLE OF THE INTENSIVE CARE NURSE  
IN THE ANTIMICROBIAL STEWARDSHIP TEAM  
AT A PRIVATE HOSPITAL, ETHEKWINI, SOUTH AFRICA**

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**Partial fulfillment of the Requirements for the  
Master of Nursing (Critical Care and Trauma)**

**BY**

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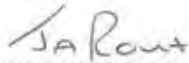
**2015**

## DECLARATION

This is to certify that Mrs. Joan Rout has prepared this dissertation report entitled "Exploring the role of the intensive care nurse in the antimicrobial stewardship team at a private hospital in eThekweni, South Africa". This dissertation is all my own work and all primary and all secondary sources have been acknowledged. This dissertation has not been submitted to any other institution as part of an academic qualification.

This dissertation is prepared in partial fulfillment of the requirements for the Master of Nursing (Critical Care and Trauma) at the College of Health Sciences, University of KwaZulu-Natal Durban, South Africa.

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## **DEDICATION**

This study is dedicated to Dr Richard Burrows, an intensivist that I have been proud to work with and to call a friend. Dr Burrows served the Critical Care Society of South Africa for several decades and has been instrumental in creating a platform for the voices of ICU nurses here in South Africa.

## **ACKNOWLEDGEMENTS**

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## ABSTRACT

### **Background:**

The care of the critically ill patient across the world has become progressively challenging with increasingly resistant pathogens resulting in difficult to treat infections. This is compounded by the decreasing effectiveness of many antibiotics. Severe infections increases the length of time spent in an ICU, increases morbidity and mortality, and increases healthcare costs. Antimicrobial stewardship (AS) has the aims of slowing resistance and the protection of patients and the wider community through the promotion of correct antimicrobial use by education and guidelines. Infection control measures are an essential part of AS in preventing emergent resistant pathogens and hospital-acquired infections.

### **Research purpose:**

The identification of the role of the ICU nurse in an AS team in a private ICU in South Africa.

### **Research approach:**

A qualitative approach was used in this study in order to obtain meaningful contributions that a questionnaire may not have been able to provide. Purposive sampling was used to identify participants from an ICU multidisciplinary AS team in a hospital in the private healthcare sector. Semi-structured interviews were conducted with fifteen participants; ICU clinical nurses, nursing management, surgeons, anaesthetists, physicians, microbiologists and pharmacists. Data were analysed and categorised using content analysis.

### **Findings:**

Perspectives of the various members of the multidisciplinary AS team identified the role of the ICU nurse in an AS team as being organisational, advocacy, clinical and collaborative. Suggestions were made to further develop this nursing role by supporting proactive behaviour, teaching and learning, and teamwork. Concerns were raised about this role relating to resource barriers, knowledge deficit, poor attitude towards work, ineffective teamwork, working in isolation, and economic pressures. A limitation to this study is that it is a small study in a single setting, which may limit generalizability.

### **Conclusion:**

The ICU nurse's role in AS is essential for the successful implementation of an AS programme. Recommendations to develop this role are made for clinical practice, education, research and policy development.

## TABLE OF CONTENTS

	Page
DECLARATION .....	i
DEDICATION .....	ii
ACKNOWLEDGEMENT .....	iii
ABSTRACT .....	iv
TABLE OF CONTENTS .....	v
 <b>CHAPTER ONE: INTRODUCTION</b>	 <b>1</b>
1.1 INTRODUCTION .....	1
1.2 BACKGROUND .....	1
1.3 PROBLEM STATEMENT .....	5
1.4 PURPOSE OF THE STUDY .....	5
1.5 OBJECTIVES OF THE STUDY .....	6
1.6 RESEARCH QUESTION .....	6
1.7 SIGNIFICANCE OF THE STUDY .....	7
1.7.1 PRACTICE .....	7
1.7.2 RESEARCH .....	7
1.7.3 EDUCATION .....	7
1.7.4 POLICY DEVELOPMENT .....	7
1.8 OPERATIONAL DEFINITIONS .....	8
1.9 SUMMARY OF CHAPTER .....	9
 <b>CHAPTER TWO: LITERATURE REVIEW</b>	 <b>10</b>
2.1 INTRODUCTION .....	10
2.2 LITERATURE SEARCH STRATEGY .....	10
2.3 ANTIMICROBIAL RESISTANCE .....	10
2.3.1 ANTIBIOTIC/ANTIFUNGAL MISUSE .....	10
2.3.2 DECREASED PRODUCTION OF ANTIMICROBIAL THERAPY .....	11
2.3.3 PUBLIC HEALTH THREAT .....	12
2.4 ANTIMICROBIAL STEWARDSHIP .....	12
2.4.1 MONITORING OF INFECTIONS IN THE ICU .....	13
2.4.2 HOSPITAL-ACQUIRED INFECTIONS IN THE ICU .....	13

	Page
2.4.3 INFECTION PREVENTION AND CONTROL IN THE ICU .....	14
2.5 THE ICU NURSE AS PART OF THE ANTIMICROBIAL STEWARDSHIP TEAM .....	15
2.6 SYMBOLIC INTERACTIONISM .....	16
2.7 SUMMARY OF CHAPTER .....	18
<b>CHAPTER THREE: METHODOLOGY</b>	<b>19</b>
3.1 INTRODUCTION .....	19
3.2 RESEARCH PARADIGM .....	19
3.3 RESEARCH APPROACH .....	20
3.4 RESEARCH SETTING .....	21
3.5 SAMPLING .....	21
3.6 PARTICIPANT PROFILE .....	22
3.7 DATA COLLECTION PROCESS .....	22
3.7.1 DATA COLLECTION INSTRUMENT .....	23
3.7.2 INTERVIEW PROCESS .....	24
3.7.3 TRANSCRIPTION OF RECORDED MATERIAL .....	24
3.7.4 DATA ANALYSIS .....	25
3.8 ACADEMIC RIGOUR .....	26
3.8.1 CREDIBILITY .....	26
3.8.2 TRANSFERABILITY .....	27
3.8.3 DEPENDABILITY .....	28
3.8.4 CONFIRMABILITY .....	28
3.9 ETHICAL CONSIDERATIONS FOR PARTICIPANTS IN STUDY .....	28
3.10 DATA MANAGEMENT .....	28
3.11 SUMMARY OF CHAPTER .....	29
<b>CHAPTER FOUR: DESCRIPTION OF FINDINGS</b>	<b>30</b>
4.1 INTRODUCTION .....	30
4.2 PRESENTATION OF FINDINGS .....	30
4.2.1 CATEGORIES AND SUB CATEGORIES .....	30
4.3 RESEARCH FINDINGS .....	31
4.3.1 THE “MASSIVE RESPONSIBILITY” OF THE ROLE OF THE ICU NURSE .....	33
4.3.1.1 ORGANISATIONAL ROLE .....	33
4.3.1.2 ADVOCACY ROLE .....	34

	Page
4.3.1.3 CLINICAL ROLE .....	37
4.3.1.4 COLLABORATIVE ROLE .....	41
4.3.2 “BEING PROACTIVE” IN THE DEVELOPMENT OF THE NURSE’S ROLE .....	43
4.3.2.1 TAKING RESPONSIBILITY FOR SAFE PATIENT CARE .....	43
4.3.2.2 FURTHER EDUCATION OF THE NURSE .....	46
4.3.2.3 IMPROVED TEAM COLLABORATION .....	48
4.3.3 MULTIFACTORIAL BARRIERS TO DEVELOPING THE NURSE’S ROLE .....	49
4.3.3.1 RESOURCE BARRIERS .....	49
4.3.3.2 KNOWLEDGE DEFICIT .....	50
4.3.3.3 POOR STAFF ATTITUDE .....	51
4.3.3.4 COLLABORATION BARRIERS .....	55
4.3.3.5 WORKING IN ISOLATION .....	59
4.3.3.6 ECONOMIC BARRIERS .....	64
4.5 SUMMARY OF CHAPTER .....	67
<b>CHAPTER FIVE: DISCUSSION OF FINDINGS</b>	<b>68</b>
5.1 INTRODUCTION .....	68
5.2 DISCUSSION OF FINDINGS .....	68
5.2.1 THE “MASSIVE RESPONSIBILITY” OF THE ROLE OF THE ICU NURSE .....	68
5.2.1.1 ORGANISATIONAL ROLE .....	69
5.2.1.2 ADVOCACY ROLE .....	71
5.2.1.3 CLINICAL ROLE .....	76
5.2.1.4 COLLABORATIVE ROLE .....	82
5.2.2 “BEING PROACTIVE” IN THE DEVELOPMENT OF THE NURSE’S ROLE .....	83
5.2.2.1 TAKING RESPONSIBILITY FOR SAFE PATIENT CARE .....	83
5.2.2.2 FURTHER EDUCATION OF THE NURSE .....	85
5.2.2.3 IMPROVED TEAM COLLABORATION .....	88
5.2.3 MULTIFACTORIAL BARRIERS TO DEVELOPING THE NURSE’S ROLE .....	89
5.2.3.1 RESOURCE BARRIERS .....	90
5.2.3.2 KNOWLEDGE DEFICIT .....	92
5.2.3.3 POOR STAFF ATTITUDE .....	95
5.2.3.4 COLLABORATION BARRIERS .....	98
5.2.3.5 WORKING IN ISOLATION .....	106
5.2.3.6 ECONOMIC BARRIERS .....	111



	Page
5.3	SYMBOLIC INTERACTIONISM ..... 119
5.3.1	SYMBOLIC INTERACTIONISM AND ROLE DEVELOPMENT ..... 119
5.3.2	SYMBOLIC INTERACTIONISM AND TEAMWORK ..... 119
5.3.3	CRITICISM OF SYMBOLIC INTERACTIONISM ..... 120
5.4	SUMMARY OF CHAPTER ..... 121
 <b>CHAPTER SIX: REFLECTIONS, SUMMARY, LIMITATIONS AND RECOMMENDATIONS</b> ..... 122	
6.1	INTRODUCTION ..... 122
6.2	RESEARCHER REFLECTIONS ..... 122
6.3	SUMMARY OF STUDY ..... 123
6.3.1	RATIONALE FOR THE STUDY ..... 123
6.3.2	LITERATURE REVIEW ..... 123
6.3.3	METHODOLOGY ..... 124
6.3.4	OVERVIEW OF FINDINGS ..... 125
6.4	LIMITATIONS OF STUDY ..... 127
6.5	RECOMMENDATIONS ..... 127
6.5.1	RECOMMENDATIONS TO ADDRESSING RESOURCE BARRIERS ..... 128
6.5.1.1	RECOMMENDATIONS FOR OPTIMAL STAFFING ..... 128
6.5.1.2	POSITIVE PRACTICE ENVIRONMENTS ..... 128
6.5.2	RECOMMENDATIONS TO ADDRESSING KNOWLEDGE BARRIERS ..... 128
6.5.2.1	CLINICAL PRACTICE IN ICU ..... 129
6.5.2.2	IN-SERVICE TRAINING ..... 129
6.5.2.3	NURSING EDUCATION ..... 130
6.5.2.4	CONTINUING PROFESSIONAL DEVELOPMENT ..... 130
6.5.3	RECOMMENDATIONS TO ADDRESSING PROFESSIONAL BARRIERS ..... 131
6.5.3.1	NURSE ATTITUDES AND POOR PERFORMANCE ..... 131
6.5.3.2	ANNUAL PERFORMANCE REVIEW ..... 131
6.5.3.3	POLICY DEVELOPMENT ..... 132
6.5.3.4	RESEARCH INTO THE ROLE OF THE ICU NURSE IN AS ..... 132
6.5.4	RECOMMENDATIONS TO ADDRESSING COLLABORATION BARRIERS ..... 132
6.5.5	RECOMMENDATIONS TO ADDRESSING AS SUPPORT BARRIERS ..... 133
6.5.6	RECOMMENDATIONS TO ADDRESSING ECONOMIC BARRIERS ..... 133

	Page
6.6 CONCLUSION .....	133

<b>REFERENCES</b>	135
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<b>ANNEXURES</b>	159
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A	INTERVIEW GUIDE .....	159
B	PARTICIPANT INFORMATION SHEET .....	160
C	CONSENT FORM .....	162
D	ETHICAL APPROVAL .....	163
E	PERMISSION REQUEST LETTER TO RESEARCH SETTING .....	164
F	CONFIRMATION OF LANGUAGE EDITING .....	165
G	INTERVIEW TRANSCRIPT - PARTICIPANT 10 .....	166

#### **LIST OF TABLES**

TABLE	3.1	DATA ANALYSIS .....	25
TABLE	3.2	TRUSTWORTHINESS .....	26
TABLE	4.1	PARTICIPANT PROFILE .....	30
TABLE	4.2	CATEGORIES, SUB CATEGORIES, SUB SUB CATEGORIES .....	32

#### **LIST OF FIGURES**

FIGURE	3.1	INTERVIEW PROCESS .....	27
FIGURE	5.1	SYMBOLIC INTERACTION PROCESS .....	120

## **CHAPTER 1: INTRODUCTION**

### **1.1 INTRODUCTION**

There is growing concern in international healthcare regarding the increase in bacterial resistance to antibiotics, particularly in critically ill patients being treated in intensive care units. Antimicrobial stewardship has developed as a proactive approach to reduce microbial resistance by promoting the appropriate use of antimicrobial therapy and effective infection control (Dellit, Owens, McGowan, Gerding, Weinstein, Burke, Huskins, Paterson, Fishman, Carpenter, Brennan, Billeter and Hooton, 2007) and has been championed by healthcare workers both around the world and here in South Africa. Although the successful implementation of such a programme within the context of intensive care requires a multidisciplinary approach, very little research has been conducted on the role of nurses within this initiative. The aim of this study, therefore, is to examine what the role of the intensive care nurse in antimicrobial stewardship might be by exploring the views of the various multidisciplinary team members in an antimicrobial stewardship programme. This chapter discusses antimicrobial stewardship within the South African context, the purpose of the study as well as the anticipated significance of the findings to nursing practice, research, education and policy development.

### **1.2 BACKGROUND**

Antimicrobial stewardship has become an important part of healthcare due to increasing bacterial resistance. The aim of this intervention is to discourage the unnecessary use of antibiotics in humans and animal husbandry by actively promoting the correct use (Doron and Davidson, 2011; World Health Organization, 2011), and advocating for better infection prevention and control within the hospital environment, in order to reduce microbial resistance and the spread of infections caused by resistant organisms (Best Care Always, 2011).

A fundamental understanding of the key principles of microbiology and the unwanted consequences of antibiotic use is essential in order to use antimicrobial therapy correctly (Charani, Cooke and Alison, 2010). The overuse, inappropriate, or unnecessary use of antibiotics and antifungal therapy contributes towards bacterial resistance (Farrer, 2011) however sub-inhibitory dosing of antibiotics may also lead to resistance in pathogens (Best Care Always, 2011). This was first referred to in Sir Alexander Fleming's Nobel Prize speech

(1945), when he cautioned against exposing bacteria to non-lethal doses of penicillin. Optimal antimicrobial therapy is achieved when the correct antimicrobial therapy is chosen for a particular infection, the correct dose is chosen for that particular antibiotic/antifungal and the correct duration is selected for the treatment (McKenzie, Rawlins and del Mar, 2013), with early de-escalation to appropriate therapy once the pathogen is known and stopping treatment when indicated (Chunnillall, Peer, Naidoo and Essack, 2015).

Bacterial resistance to the major antimicrobial therapies used in healthcare is rising (Centre for Disease Control, 2013) and has become a major public health problem (Fraimow and Nahra, 2013). By 1998, over a period of just 10–15 years, the proportion of isolates of *Staphylococcus aureus* resistant to methicillin increased from almost zero to nearly 70% in Japan and the Republic of Korea, 40% in Belgium, 30% in the United Kingdom (UK), and 28% in the USA (Smith and Coast, 2002). The Infectious Diseases Society of America (IDSA) has identified top resistant pathogens as gram negative pathogens; *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Acinetobacter*, and gram positive pathogens; community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA), penicillin-resistant *Streptococcus pneumoniae* (PRSP) and vancomycin-resistant *Enterococci* (VRE) (Dellit, Owens, McGowan *et al.* 2007).

North America uses 52% of the world's financial resources and 37% of the world's healthcare workers with 10% of the global burden of disease. In contrast, Africa has 24% of the global burden of disease but only 3% of health workers to serve that need (World Health Organisation, 2006; Sheer and Wong, 2008). Sub-Saharan Africa is estimated to have 25% of the global burden of disease but only 1.3 % of the global trained health workforce (Dovlo, 2007). World Health Organisation (WHO) figures suggest that in 2007 the United States had 9.37 nurses and 2.56 doctors per 1000 population. The same report stated that Botswana, in Sub-Saharan Africa, had 2.65 nurses and 0.40 doctors per 1000 population with South Africa a little better off with figures of 4.08 nurses and 0.77 doctors per 1000 population (World Health Organisation, 2007; Sheer and Wong, 2008; Argent, 2009).

Communicable diseases are the principal cause of mortality in Africa with HIV/AIDS having an all-cause mortality of 12.9%, followed by lower respiratory tract infections at 11.2% and diarrhoeal disease at 9.1% (Bruijns, Green and Wallace, 2012). Mayosi, Lawn, van Niekerk, Bradshaw, Karim and Coovadia (2012), note that the top three diseases on the list of the

burden of diseases in South Africa are poverty-related diseases, emerging chronic diseases and infectious diseases. With these health concerns South Africa is currently undergoing a reform of its healthcare system from a dominant hospital-based service to a district-based primary healthcare service (De Beer, Brysiewicz and Bhengu, 2011). These changes in the healthcare system have resulted in the relocation of resources from academic centres to primary care with a detrimental effect on the provision of what is seen to be expensive intensive care (Hanekom, Coetzee, and Faure, 2006). South Africa, as a developing country faces the challenges of poverty, high levels of HIV and tuberculosis, inadequate healthcare for lower socioeconomic groups and often poor patient compliance with adhering to medication regimes. Healthcare professionals compound these problems through often unnecessary and incorrect antimicrobial use (Mendelson, Whitelaw, Nicol and Brink, 2012). KwaZulu-Natal has some of the poorest rural populations in South Africa with estimations of around 1.5 million HIV positive people (Cooke, Tanser, Bärnighausen, and Newell, 2010). In 2010, 1.8 million South Africans were recorded as undergoing treatment on antiretrovirals which was thought to have reached only half of those infected with HIV/AIDS. 401 048 South Africans received treatment for tuberculosis over the same period (De Beer, Brysiewicz and Bhengu, 2011).

Hospitals in South Africa are facing the growing challenge of micro-organisms resistant to routine antibiotic therapy such as; vancomycin-resistant *Staphylococcus aureus* and *Enterococcus faecium*, penicillin-resistant *Streptococcus pneumoniae*, methicillin-resistant *Staphylococcus aureus*, third-generation cephalosporin-resistant *Escherichia coli* and *Klebsiella pneumoniae*, carbapenem-resistant *Klebsiella pneumoniae*, *Enterobacter spp.* and *Pseudomonas aeruginosa*, glycopeptide-resistant *Enterococci*, multidrug-resistant *Mycobacterium tuberculosis*, *Acinetobacter baumannii*, *Escherichia coli* and *Pseudomonas aeruginosa* (Best Care Always, 2011). Many years of poor antibiotic prescribing in both medical and veterinary fields, and ineffective infection prevention and control in South African hospitals means that we are on ‘the brink of a return to an era of untreatable bacterial infection’ (Mendelson, Whitelaw, Nicol *et al.* 2012:607).

The Infectious Diseases Society of Southern Africa (IDSSA), the Federation of Infectious Diseases Societies of Southern Africa (FIDSSA), the Infection Control Society of Southern Africa (ICSSA), the South African Society for Clinical Microbiology (SASCM) and the South African Antibiotic Stewardship Programme (SAASP) are expressing growing concern.

In an article titled ‘Wake up, South Africa! The antibiotic “horse” has bolted’, the goals of antibiotic stewardship are discussed; these are that the overall consumption of antibiotics needs to be reduced, the duration of therapy monitored in accordance with evidence-based guidelines and mandatory de-escalation from broad-spectrum empiric therapy to targeted narrow-spectrum antibiotics with the use of antibiograms (Mendelson, Whitelaw, Nicol *et al.* 2012). The University of KwaZulu-Natal has acknowledged the importance of this issue in South Africa with the appointment of Professor Sabiha Essack, a pharmacist, to the first research chair in antibiotic resistance in the country (The Mercury, September 11, 2015). Professor Essack is co-chair of the South African Chapter of the Alliance for the Prudent Use of Antibiotics (APUA) with research interests in antibiotic resistance, antibiotic use, bacterial resistance to extended-spectrum beta-lactamase (ESBL) resistance, nosocomiology and infection control and antibiotic resistance determinants in agriculture (downloaded September 2015).

Extensive antibiotic use in human healthcare and animal farming (Spellberg, Powers, Brass, Miller and Edwards, 2004) compounded with a reduction in the production of antimicrobials has resulted in fewer agents available to manage difficult infections in the critically ill. Decreased bacterial susceptibility and nosocomial infections caused by resistant bacteria are linked to extensive antibiotic use (Madaras-Kelly, 2003) resulting in prolonged intensive care stays, increased morbidity and mortality and healthcare costs being reported by studies from different countries around the world (Arias and Murray, 2009; Leroy, Gangneux, Montravers, Mira, Gouin, Sollet, Carlet, Reynes, Rosenheim, Regnier and Lortholary, 2009; Deege and Paterson, 2011).

Intensive care nurses manage the care of the critically ill patient from the bedside and are with the patient for 24 hours a day. They are considered an important part of the intensive care team and as stakeholders, need to be included in this important healthcare initiative (Ohl and Luther, 2014). Antimicrobial stewardship has the dual aspects of optimal antimicrobial management and of diligent infection control (Best Care Always, 2011). Infection control has become a large part of nursing responsibilities in the intensive care arena but the nurse does not yet have clear responsibilities with regards to antimicrobial therapy (Edwards, Loveday, Drumright and Holmes, 2011).

### 1.3 PROBLEM STATEMENT

The intensive care unit (ICU) has the most vulnerable patients to infection and uses the most antibiotics in a hospital (Kaki, Elligsen, Walker, Simor, Palmay and Daneman, 2011). Antimicrobial resistance and the poor management of antibiotic usage is one of the most important issues facing critical care across the world this century (Mendelson, Whitelaw, Nicol *et al.* 2012). There has been much work done on antimicrobial stewardship as seen by the current studies in the literature review (Charani, Cooke and Alison, 2010; Cunha, Varughese and Mylonakis, 2013; Chunnillall, Peer, Naidoo *et al.* 2015) and guidelines to effectively provide this stewardship (Brink, Feldman, Duse, Gopalon, Grolman, Mer, Naicker, Paget, Perovic and Richards, 2006; Dellit, Owens, McGowan *et al.* 2007; Best Care Always, 2011). However, there is very little mention of the nurse in current literature and it appears that the role of the nurse and the skills that are required of the nurse within antimicrobial stewardship have not been adequately explored (Edwards, Drumright, Kiernan and Holmes, 2011; Ziady, 2012).

Antimicrobial stewardship in hospitals in many parts of the world is being driven by multidisciplinary teams consisting of infectious disease specialists, pharmacists, microbiologists and other disciplines (Centre for Disease Control, 2013). In order to effectively address the dual challenges of inappropriate antimicrobial prescription and antimicrobial resistance, it is necessary for *all* members of the interdisciplinary team to fully participate in antimicrobial stewardship programmes (Best Care Always, 2011). The intensive care nurse plays a large part in the care of critically ill patients. Therefore the role of these nurses, with regards to antimicrobial therapy and microbial resistance and the way that supporting this role may contribute to better antimicrobial stewardship, needs to be examined (Edwards, Loveday, Drumright *et al.* 2011).

### 1.4 PURPOSE OF THE STUDY

The purpose of this study was to explore the role of the intensive care nurse in an antimicrobial stewardship team in the private healthcare sector in South Africa, from the perspectives of the antimicrobial stewardship team members.

## 1.5 OBJECTIVES OF THE STUDY

The objectives of the study were to:

1. explore the perceptions of members of the interdisciplinary antimicrobial stewardship team of the role of the intensive care nurse in the daily working of the antimicrobial stewardship programme in this general intensive care unit
2. explore the perceptions of members of the interdisciplinary antimicrobial stewardship team with regard to the contributions of the different members of this team to antimicrobial stewardship in this general intensive care unit with particular reference to the role of the intensive care nurse
3. explore communication patterns within the interdisciplinary antimicrobial stewardship team in this general intensive care unit with particular reference to the role of the intensive care nurse
4. explore perceived barriers to communication in the interdisciplinary antimicrobial stewardship team in this general intensive care unit with particular reference to the role of the intensive care nurse
5. explore the collaborative role of the intensive care nurse in the interdisciplinary antimicrobial stewardship team in this general intensive care unit
6. explore perceived barriers to developing the role of the intensive care nurse in the interdisciplinary antimicrobial stewardship team in this general intensive care unit

## 1.6 RESEARCH QUESTION

- a) What are the perceptions of members of the interdisciplinary team with regard to the role of the intensive care nurse as a member of the antimicrobial stewardship team in an adult general intensive care unit in eThekweni?
- b) What are the perceptions of the members of the interdisciplinary team with regard to communication and collaboration within the antimicrobial stewardship team?
- c) What are the perceptions of members of the interdisciplinary team with regard to the development of the role of the intensive care nurse within the antimicrobial stewardship team?
- d) What are the perceptions of members of the interdisciplinary team with regard to barriers to the development of the role of the intensive care nurse within the antimicrobial stewardship team?



## 1.7 SIGNIFICANCE OF THE STUDY

A brief review of literature indicates little information regarding what is required of the intensive care nurse within antimicrobial stewardship. Clarification of the role of the nurse as part of the ICU antimicrobial stewardship team may guide clinical practice, inform hospital management, allow focused direction of nursing education and support growing understanding of antimicrobial stewardship.

### 1.7.1 PRACTICE

The intensive care nurse works closely with other healthcare practitioners in the care of critically ill patients and is ideally placed to contribute positively in all aspects of patient care. This study may assist in identifying the clinical and collaborative role of the nurse within the antimicrobial stewardship team.

### 1.7.2 RESEARCH

There is very little nursing research on the role of the intensive care nurse in antimicrobial stewardship. This study may assist in identifying possible areas of future research to provide evidence-based solutions for clinical practice, education and policy development.

### 1.7.3 EDUCATION

Nursing education should be evidence-led and maintaining contact with current issues in nursing such as resistant pathogens in hospitals and the community and the challenges of difficult-to-treat infections, is important in effective preparation of nurses for clinical practice. If the nurse is inadequately prepared in nursing training, the implementation of antimicrobial stewardship programmes may not be effective. This study may provide information regarding the role of the intensive care nurse in antimicrobial stewardship and may assist in the identification of educational needs.

### 1.7.4 POLICY DEVELOPMENT

Policy development and changes to existing policies arise from the identification of areas of concern within clinical practice such as the perceived overuse of antimicrobial therapy and infections from resistant organisms in the intensive care unit. Once concerns have been substantiated by research, evidence-based policy can be developed in order to effect changes in the practice of nursing. This study may provide information to assist in policy development within the intensive care area.

## 1.8 OPERATIONAL DEFINITIONS

### 1.8.1 Intensive care:

This is the clinical field of acute care of very ill and unstable patients who are suffering from life-threatening illnesses or injuries and require immediate clinical intervention to restore homeostasis (De Beer, Brysiewicz and Bhengu, 2011). The term intensive care is sometimes used interchangeably with critical care in various countries around the world. In South Africa the term critical care is used in the literature however reference is made to the areas where critically ill patients are managed, as intensive care units.

### 1.8.2 Intensive care nurse:

In this study the intensive care nurse refers to the registered nurse who works and is experienced in this clinical field of acute care and who may or may not have intensive care specialization training.

### 1.8.3 Role:

This role encompasses the clinical, administrative and collaborative duties that the intensive care nurse needs to perform in order to meet the requirements of an antimicrobial stewardship programme. These duties are supported by professional maturity and a sound knowledge of infective organisms, antimicrobial resistance, optimal usage of antibiotics and current issues relating to the critically ill patient.

### 1.8.4 Antimicrobial Stewardship:

Antimicrobial stewardship means a collaborative effort between members of an antimicrobial stewardship team to promote effective and judicious antibiotic use. Ziady (2012) defines antibiotic stewardship as the responsible use of a threatened healthcare resource.

### 1.8.5 Antimicrobial Stewardship Team:

In this study this team comprises intensive care nurses, the infection prevention and control nurse, medical specialists, microbiologists and pharmacists who work together to control antibiotic usage within a particular healthcare area (Best Care Always, 2011).

### 1.8.6 Nursing participants:

This term is used to describe nurses from hospital management and clinical nurses from ICU who participated in this study.

### 1.8.7 Non-nursing participants:

This term is used to describe participants from healthcare disciplines other than nursing and includes microbiologists, pharmacists, anaesthetists, surgeons and physicians.

#### 1.8.8 Doctors:

This term describes medical specialists who prescribe treatment, including antimicrobial therapy, for patients under their care in ICU. In this study these medical specialists are anaesthetists, surgeons and physicians.

### 1.9 SUMMARY OF CHAPTER

The challenges of increasing bacterial resistance are given to provide a background portion to this study. A brief review of current nursing and medical literature has shown that little consideration has been given with regard to how the ICU nurse can participate in antimicrobial stewardship in order to address this public health crisis. The purpose and objectives of this study are presented along with the research question and the significance of the study to practice, research, education and policy development. Operational definitions are provided.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 INTRODUCTION

An initial review of current literature identified issues leading to the development of antimicrobial stewardship programs in intensive care units. A further review of literature was conducted during the course of the study as issues arose during the interview process, in accordance with the principles of qualitative research (Burns and Grove, 2009:91).

### 2.2 LITERATURE SEARCH STRATEGY

Four sources were used in the literature search. These were:

- International health-related websites such as that of the World Health Organisation and the Centre for Disease Control.
- South African websites such as ‘*Best Care, Always*’ and the website of the South African Critical Care Society.
- References obtained from the reference list at the end of journal articles.
- Electronic databases: Google-scholar, CINAHL, Pub Med and EBSCO Host.
- The search words/terms used in retrieving relevant material included: *antimicrobial resistance, antimicrobial stewardship, antimicrobial stewardship team, role of the antimicrobial stewardship nurse.*

### 2.3. ANTIMICROBIAL RESISTANCE

Antimicrobial resistance has been linked to antibiotic and antifungal misuse both in human healthcare and livestock management. Decreasing availability of antimicrobials to treat difficult infections is attributed to the growing ineffectiveness of these medications due to increasing resistance and to the move of the pharmaceutical industry away from research and production of these products. This has led to a public health crisis impacting on countries across the world, with healthcare workers in hospitals increasingly concerned about how to adequately manage infections in critically ill patients.

#### 2.3.1 ANTIBIOTIC/ANTIFUNGAL MISUSE

One of the greatest milestones in healthcare has been the discovery of antibiotics (Jacob and Gaynes, 2010), however increasing microbial resistance to antibiotics worldwide has resulted in the World Health Organization (2011) warning caution on the indiscriminate use of antibiotics. The threat of multiresistant pathogens is a major public health issue that requires

cooperation ‘from a wide range of stakeholders, including healthcare professionals, veterinarians, agriculturalists, pharmaceutical manufacturers, government, media representatives, consumers and other interested parties’ (Gottlieb and Nimmo, 2011:283). Guidelines formulated by the Infectious Diseases Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA), state that as much as 50% of antibiotic use is inappropriate and is associated with poor patient outcomes, resistance development and increased healthcare costs (Dellit, Owens, McGowan *et al.* 2007). The overuse and misuse of antimicrobial medicines and poor infection control practices encourage the spread of antimicrobial resistance (Federation of Infectious Diseases Societies of Southern Africa, 2012; World Health Organisation, 2013).

Increasing use of broad-spectrum antibiotics as empirical treatment is leading to multidrug resistance with fewer antibiotics available to fight these infections (Alanis, 2005; Jacob and Gaynes, 2010) with countries across the world facing untreatable bacterial infections due to the emergence of pan-resistant Gram negative infections (FIDSSA, 2012). Patients whose condition required initial broad-spectrum treatment were noted to have an increased risk of infection with resistant strains and increased mortality (Brink, Botha, van den Ende and Budavari, 2003). It is therefore necessary to curtail the current use of broad-spectrum agents, if infections are to be treated effectively in the future (Paruk, Richards, Scribante, Bhagwanjee, Mer and Perrie, 2012). It is essential to change to a narrow-spectrum agent as soon as the causative organism has been identified in order to reduce the risk of resistance (Farrer, 2011; Katsios, Burry, Nelson, Jivraj, Lapinsky, Wax, Christian, Mehta, Bell and Morris, 2012).

### 2.3.2 DECREASED PRODUCTION OF ANTIMICROBIAL THERAPY

Spellberg, Powers, Brass *et al.* (2004), examined the databases of the United States Food and Drug Administration (FDA) and found that approval of new antibacterial agents had decreased by 56% over the past 2 decades. In this study it was found that research and production of drugs has shifted to those used for chronic healthcare, with planned development of antimicrobial agents just 6 out of 506 other drugs. Academic researchers, their institutions, industry and government need to work together to address the problem of the lack of effective antibiotics (Arias and Murray, 2009). Since the beginning of 2008 the US FDA has approved only one new antibacterial antibiotic, telavancin for use in MRSA (Jacob and Gaynes, 2010).

Legislation and regulatory processes are seen as restrictive by the pharmaceutical industry. The Infectious Diseases Society of America (IDSA) has recently supported a limited population antibacterial drug (LPAD) approval pathway in order to address this (Spellberg, Powers, Brass *et al.* 2004). Clinical trials where all infections caused by a resistant pathogen are studied under a pathogen umbrella in a microbe-driven clinical study, as opposed to a disease-driven study, may facilitate the development of much needed antibiotics (Gould and Bal, 2013).

### 2.3.3 PUBLIC HEALTH THREAT

The 21<sup>st</sup> century has brought great challenges in the management of infection with ageing populations, restricted healthcare resources, increased demands for modern medicine and increasing antimicrobial resistance (Dancer, 2013). The combination of growing antimicrobial resistance and the collapse of antibiotic research and development has serious implications for future management of infectious diseases (Alanis, 2005; Spellberg, Bartlett, and Gilbert, 2013). ‘Antimicrobial resistance is not just a multidrug, multibug problem; it is a multihost, multicountry problem as well’ (Woolhouse and Ward, 2013:1461).

Concerns raised in the 2002 Bulletin released by the World Health Organization, were that bacterial resistance had become a major threat to public health and that a very real possibility existed of diseases moving between countries with the message that it is essential that collective action is taken by all countries in order to contain antimicrobial resistance and to achieve a balance between the need for treating existing infections with the use of antimicrobials *now* against the need for reducing antimicrobial resistance *in the future* (Smith and Coast, 2002). More than a decade later the World Health Organization has released the 2014 Global Surveillance report which assessed antimicrobial resistance in 114 countries, including resistance in HIV, malaria, tuberculosis, and influenza, and raised the concern that the world is heading for a ‘post antibiotic era’ with ‘the end of modern medicine as we know it’ in which common illnesses and minor injuries can once again kill (World Health Organisation, 2014).

### 2.4 ANTIMICROBIAL STEWARDSHIP

With antimicrobial resistance growing globally, critical care organizations and government bodies have urged vigilance in the administration of antimicrobial agents. Useful guidelines have been provided by the Infectious Diseases Society of America (IDSA), and the USA

based Centre for Disease Control (CDC) for the proper management of infections (Dellit, Owens, McGowan *et al.* 2007). Several organizations in South Africa; the Infectious Diseases Society of Southern Africa (IDSSA), the Federation of Infectious Diseases Societies of Southern Africa (FIDSSA), the Infection Control Society of Southern Africa (ICSSA), and the South African Society for Clinical Microbiology (SASCM), have expressed concern about growing antibiotic resistance and have issued local guidelines for use by healthcare workers here in this country (Mendelson, Whitelaw, Nicol *et al.* 2012). Surveillance of pathogens and careful use of antibiotics form the basis of antimicrobial stewardship. Records of infections, antibiotic usage and bacterial resistance are important for surveillance purposes (Brink, Moolman, Cruz da Silva and Botha, 2007; Centre for Disease Control, 2013) in order to build up national and local information in order to understand the evolving relationship between antibiotic consumption and the emergence of resistance (Charani, Cooke and Alison, 2010).

#### 2.4.1 MONITORING OF INFECTIONS IN THE ICU

An important objective of antimicrobial stewardship is the introduction of stringent infection control measures to minimize hospital-acquired infections with emphasis on the early identification of infections (Best Care Always, 2011). Taking appropriate cultures from ‘sterile’ sites such as blood cultures, rather from ‘non sterile’ sites such as wounds which may be contaminated or colonized, is essential to ensure appropriate antimicrobial management (Mendelson, Whitelaw, Nicol *et al.* 2012). It is important that specimens are taken correctly and recommendations are that at least 2 sets of blood cultures should be taken before starting antimicrobial therapy. Both aerobic and anaerobic bottles should be used with at least one set drawn percutaneously and one set drawn through each invasive device (Dellinger, Levy, Rhodes, Annane, Gerlach, Opal, Sevransky, Sprung, Douglas, Jaeschke, Osborn, Nunnally, Townsend, Reinhart, Kleinpell, Angus, Deutschman, Machado, Rubenfeld, Webb, Beale, Vincent and Moreno, 2012). Each blood culture bottle should have a minimum of 10 mls placed in it and if there is difficulty obtaining sufficient blood, the entire specimen should be placed in the aerobic bottle (Majumdar and Padiglione, 2012).

#### 2.4.2 HOSPITAL-ACQUIRED INFECTIONS IN THE ICU

Due to the burden of disease in South Africa, patients presenting in South African ICUs are often ill with HIV or TB, or both of these diseases and are extremely vulnerable to serious opportunistic infections which impact upon morbidity and mortality. Baseline data of patients

in a South African ICU showed that 21% of patients tested positive for HIV with a subsequent vulnerability to opportunistic infections (Hanekom, Coetzee, and Faure, 2006). Another South African study showed that critically ill patients with severe sepsis had an ICU mortality of 59%, as compared to patients without sepsis who had an ICU mortality of 25%. Within this study there were 304 admissions with an average APACHE II score of 17.4 and an ICU mortality of 37%. ICU patient groups with increased mortality were; immunocompromised patients (62%), severe sepsis (59.4%), community-acquired pneumonia (53%), pulmonary tuberculosis (45%) and other medical conditions (42%). The authors noted that patients were only tested for HIV if this was felt to contribute to the differential diagnosis or management therefore the number of immune-compromised patients could have been higher in this study (Van der Merwe, Kidd, Metzker, Bolliger and Irusen, 2005).

The critically ill patient is vulnerable to infection during hospitalisation even without prior chronic illness. An early study by Van Saene, Curran, Stoutenbeck and Percival (1990) noted that there are three main ways in which normal barriers to infection are breached; firstly trauma, surgery, and burns create a situation in which the patient is vulnerable to infection through damage to the skin. Secondly, intubation, catheterisation, wounds and intravascular lines promote colonisation by bacteria. Finally, the inability to swallow (secondary to intubation), ileus and inhibition of peristalsis by morphine may lead to overgrowth of microorganisms. Later studies have found that a delay in the commencement of early enteral feeding may lead to translocation of bacteria through the intestinal mucosa (Ralls, Miyasaka and Teitelbaum, 2014).

#### 2.4.3 INFECTION PREVENTION AND CONTROL IN THE ICU

Factors driving resistance are bacterial selective pressure and the transmission of pathogens by healthcare workers (Rice, 2003). Antibiotic stewardship with an effective infection control programme has been shown to reduce the emergence and transmission of antibiotic-resistant bacteria (Best Care Always, 2011). One aspect of infection control is the prevention of the emergence of resistant pathogens and the other is preventing the spread of these organisms within the healthcare environment (Cunha, Varughese and Mylonakis, 2013).

The '*Best Care, Always*' infection prevention programme is being implemented in increasing numbers of hospitals in South Africa. This campaign was started in 2009 and assists Southern African healthcare organizations in implementing evidence-based interventions that promote



best practice in hospital care (Brink, Coetzee, Clay, Corcoran, van Greune, Deetlefs, Nutt, Feldman, Richards, Nordmann, and Poirel, 2010). ‘*Best Care, Always*’ promotes the use of ‘bundles’ which consist of set measures or interventions that can be applied to prevent infection, especially in high-risk areas such as intensive care or high care units. These bundles are compiled from simple, evidence-based clinical measures and procedures that aim to improve the hospitalization outcome of all patients (Ziady, 2012).

Brink, Botha, van den Ende *et al.* (2003) refer to the work of Semmelweis (1818-1865) which showed that hand washing is not only an extremely simple measure to prevent infections but is also very effective. Hand hygiene is a key element in infection control to prevent cross-transmission of pathogens by healthcare workers (Majumdar and Padiglione, 2012) and has been identified as one of the most important aspects of infection control in intensive care units (Drew, 2009; Deege and Paterson, 2011; du Toit, 2012) however compliance with hand hygiene continues to be poor amongst healthcare workers (Perovic, 2011). World Health Organisation ‘Guidelines on hand hygiene in healthcare’ (2009), advise washing hands if soiled and using a hand spray when necessary. According to these guidelines, the five important “moments” for hand hygiene are before touching a patient, before clean or aseptic procedures, after the possibility of body fluid exposure, after touching a patient and after touching patient surroundings. An editorial article by Michell (2010) states that hand disinfection is vital when working with ill patients but may be difficult to achieve in intensive care units where staffing is a problem and a one-to-one nurse-to-patient ratio may not be possible.

## 2.5 THE ICU NURSE AS PART OF THE ANTIMICROBIAL STEWARDSHIP TEAM

The successful implementation of antimicrobial stewardship requires all members of the healthcare team to work together (Ziady, 2012; Olans, 2013; Landenheim, Rosembert, Hallam and Micallef, 2013). The ICU nurse is integral to the implementation of clinical decisions and because of the particular nature of patient care within this acute care area is ideally placed to participate within an antimicrobial stewardship program. Michell (2011) suggests that the management of the patient in intensive care should be team-based and identifies nurses as part of the team. Collaboration with other disciplines is important to provide effective patient care in ICU (Williams, Bost, Chaboyer, Fulbrook, Alberto, Thornsteindóttir, Schmollgruber and Chan, 2012).

Charani, Castro-Sánchez and Holmes (2014), state that the nurse is underused in providing a foundation for antimicrobial stewardship. They identify nurses as possessing a vast amount of clinical and microbiological information about the patients in their care and the trends of antimicrobial usage, and state that the nurse has the potential to influence decision-making. ‘The implications for the increased involvement of nurses are profound in particular as their role as organizational knowledge brokers is recognized’ (Charani, Castro-Sánchez and Holmes, 2014:171). Nurses are an important part of antimicrobial stewardship (Charani, Cooke and Alison, 2010) with the South African Antibiotic Stewardship Programme (SAASP) promoting the monitoring of antibiotic use by hospital pharmacists, microbiologists, doctors *and* nurses (Mendelson, Whitelaw, Nicol *et al.* 2012). The lack of both medical and nursing literature which makes reference to nurses on aspects of stewardship may reflect a wider lack of understanding amongst healthcare professionals of the nurse’s actual and potential role in antimicrobial stewardship.

## 2.6 SYMBOLIC INTERACTIONISM

Symbolic interactionism, a theory rooted in social psychology, is seen to be relevant to this study and was chosen to support the researcher’s understanding of the role of the intensive care nurse within antimicrobial stewardship. Benzies and Allen (2001), state that symbolic interactionism is based on the assumption that an individual’s behaviour should be considered in the context of that particular environment. The basic assumptions of symbolic interactionism are that peoples’ behaviour, both individually and collectively, is based on the meanings which something has for them. These meanings arise from the process of interactions with others, and behaviour is seen as a dynamic process. Abstract and reflective thinking is a vital part of the human capacity for cognitive thinking. This supports the development of the symbolic use of language for a common understanding of interaction with others.

Blumer (1900-1986), a student of Mead, is acknowledged as naming this work ‘symbolic interactionism’ in 1937. Mead (1863-1931), a professor of philosophy at the University of Chicago claimed that ‘the mind is a result of an exchange of social acts, language being the most complex social act in which people engage’ (Benzies and Allen, 2001:543). The theory of symbolic interactionism consists of three core principles; meaning, language and thought. Proponents of symbolic interactionism believe that language used within a particular context is relevant to that group of interactions and serves as a foundation for understanding between

individuals and a sense of belonging to a specific group (Carlson, Pilhammar and Wann-Hansson, 2010).

Bhengu (2012) describes the symbolic interactionist theory with regard to role development in nursing, as outlined by Joel (2004), in which the formation of role identity is seen to be inductive and complex. This is a dynamic process in which a role creatively adapts to a particular social environment. Role identity results from reciprocal interaction of individuals within a group in which the self identity of that individual is shaped by the reflected appraisal of others. Communication within this role is enabled by the use of common language and symbols which hold the same meaning for each person. A role is dependent on the context that has created the role, the requirements for the performance of that role and the interactions that the person has with others while executing that role. The ICU nurse who is part of the antimicrobial stewardship team has duties and responsibilities that are particular to that role. The performance of these duties and the acceptance of these responsibilities are known to members of other disciplines who are part of the antimicrobial stewardship team.

Nursing roles are not always clearly defined in an environment where expectations of nursing competencies are changing rapidly. Kleinpell (2005), in a five year study of the practice of intensive care nurses, notes the rapid change from a purely clinical role to encompass other responsibilities such as administrative, teaching, quality initiatives, research and collaborative roles. This is a time of 'considerable uncertainty' for nurses (Srivastava, Tucker, Draper and Milner, 2008). Powell and Davies (2012) suggest that relationships between nurses and doctors in the critical care setting impact on patient care. Reciprocal social interaction has an influence on subsequent behaviour (Benzies and Allen, 2001) and working within a team means that one needs to understand the roles of all team members, not only one's own role (Atwal and Caldwell, 2006). Sheehan, Robertson, and Ormond (2007) suggest that communication and collaborative teamwork are supported by the theory of symbolic interaction. 'The symbolic interactionist believes that people learn to "see" the world from their interactions with other people and will therefore develop shared meaning of situations, people and themselves through a process of interpretation. Thus, members of a team are viewed as saying and doing things because they have learned to "see" things in a particular way' (Sheehan, Robertson, and Ormond, 2007:20).

## 2.7 SUMMARY OF CHAPTER

The review of the literature considers the reasons why antimicrobial stewardship has become so important in healthcare today. It presents public health concerns and the need for international vigilance. The principles of antimicrobial stewardship are discussed within the ICU arena, highlighting the vulnerability of critically patients to opportunistic infection and the need for all healthcare workers within this arena, including nurses, to participate in antimicrobial stewardship. Symbolic interactionism is used as the underpinning theory for this study and is discussed with particular reference to the role of the intensive care nurse within the antimicrobial stewardship team.

## **CHAPTER THREE: METHODOLOGY**

### **3.1 INTRODUCTION**

This chapter describes the methodology adopted in this study for exploring the role of the intensive care nurse in the antimicrobial stewardship team from the different perspectives of various healthcare disciplines on this team. The research paradigm, research approach, study location, study population, sampling strategy and size, data collection and analysis, data management, mechanisms to assure quality of the study and ethical considerations for participants in the study are described.

### **3.2 RESEARCH PARADIGM**

This study is conducted from the viewpoint of the constructivist paradigm and seeks to explore how the role of the intensive care nurse within the antimicrobial stewardship team is viewed by both the nurses and the other members of the team. According to Houghton, Hunter and Meskell (2012) a paradigm is made up of: ontology, meaning a person's beliefs about reality: epistemology, which can be described as the relationship between the researcher and what can be known: and methodology, which is how the research is to be conducted taking into account the research question and the context in which the study is to be conducted.

The constructivist paradigm is that the human, social world and the natural, physical world are different and must be studied differently (Creswell, 1998:20). Ontology assumptions of constructivism are that humans grow to know and understand the world by the interactions that they have had with other humans (Burns and Grove, 2009:53). The ontology of this study is to explore what exists i.e. what knowledge the participants of this study have of the functioning of the intensive care nurse within the antimicrobial stewardship team. Epistemology assumptions of constructivism are that human nature is dynamic; it changes according to the situation and consequently is seen as contextual (Patton, 2002:98; Krauss, 2005). The epistemology of this study is that the knowledge the participants of this study have of the role of the intensive care nurse, has developed as a result of collaborative contact while participating in antimicrobial stewardship within this intensive care unit. The theory of symbolic interactionism has been chosen by the researcher to support this study and this is closely aligned with the assumptions stated above of the constructivist paradigm.

Qualitative methodology allows the researcher to increase understanding of the human condition. Qualitative research is described by Patton (2002:5) as research where the focus is on people, their experiences and the meaning that they derive from these experiences. Each participant is seen to have a sense of a situation and multiple perceived realities of the participants are valued (Erlingsson and Brysiewicz, 2012). Qualitative research generally has the natural setting of the participants as the area under study, it is descriptive in nature, the data presented in the results includes portions of the transcripts in order to substantiate the analysis, and the researchers are concerned with process rather than just outcomes. Small samples are chosen and conditions established which provide prolonged contact with each participant to assist in establishing trust (Brysiewicz, 2012). This study is anticipated to yield rich in-depth data as the participants chosen are members of the antimicrobial stewardship team in this intensive care unit. Each member will have experience of working with other members of this team and will have a true sense of what it is to function within the team.

### 3.3 RESEARCH APPROACH

Content analysis has been used to conduct this study. An inductive approach has been used as little is known about the phenomenon under study (Elo and Kyngas, 2008). Descriptive categories arising from the data is described as conventional content analysis (Hsieh and Shannon, 2005). Krippendorff (1980) suggested the use of content analysis methodology could be broadened from analysis of the written word to include analysis of other data such as recordings of interviews and has evolved from word counts to a more qualitative interpretation of data. Every content analysis, according to Krippendorff (1980), should answer six questions; what data is being analyzed, where is it coming from, how is this data defined, what is the context in which this data is found, what are the boundaries of the analysis and what is the 'target of the inferences' (Stemler, 2001).

Content analysis assists in uncovering patterns, themes and categories important to a social reality in a particular setting (Zhang and Wildemuth, 2005) and is well suited to examining data from nursing research phenomenon (Elo and Kyngas, 2008). All social interactions are facilitated by communication, whether group or individual (Holsti, 1969; Erlingsson and Brysiewicz, 2012). Mayring (2000) notes that content analysis as a methodological approach began to be used in the second half of the 20<sup>th</sup> century in the humanity disciplines such as sociology, psychology. Symbolic interactionism has been used to support this research

approach as it assists in examining the perceptions of study participants with regards to the role of the ICU nurse within the social reality of the antimicrobial stewardship group.

### 3.4 RESEARCH SETTING

The setting for this study is a newly built hospital situated in a semi-rural area just within the municipal boundaries of Durban (eThekweni) in KwaZulu-Natal, South Africa. This hospital has been chosen for this study as it has a new antimicrobial stewardship programme which is being developed by nursing management. The hospital is in the private healthcare sector, has 200 beds and services a mixed-income community with a large number of schools, young families and a high number of elderly retired people. The hospital has an adult general intensive care unit which receives a variety of medical and surgical cases with the majority of the patients being above fifty years of age. It has twenty beds, ten of which are designated high care, and ten designated intensive care.

### 3.5 SAMPLING

Purposive sampling was used (Daly, Willis, Small, Green, Welch, Kealy and Hughes, 2007) and healthcare professionals, who are part of the antimicrobial stewardship programme within this ICU, were approached to request their participation in this study. These participants were chosen as they were most likely to have the data to answer the research question and therefore in a position to contribute to the study (Marshall, 1996; Coyne, 1997; Erlingsson and Brysiewicz, 2012). The spread of participants over the disciplines of nurses, doctors, microbiologists and pharmacists, was seen by the researcher as necessary in order to obtain different perspectives from team members of the nurse's role within this team (Shenton, 2004).

Inclusion criteria:-

- Intensive care nurse participants were required to be registered as a general nurse with the South African Nursing Council.
- Intensive care nurse participants were required to have been employed to work in this intensive care unit for a minimum of two years.
- Intensive care nurse participants were required to be part of the antimicrobial stewardship programme in this intensive care unit.
- Medical specialist participants were required to care for patients in this intensive care unit.

- The microbiologist was required to be part of the antimicrobial stewardship programme in this intensive care unit.
- The pharmacist was required to be part of the hospital pharmacy service.

Exclusion criteria:-

- Nurses on night duty do not participate in antimicrobial stewardship rounds so were not included in the study as they do not have personal knowledge of the antimicrobial stewardship programme.

### 3.6 PARTICIPANT PROFILE

All healthcare workers who participate in antimicrobial stewardship within this general ICU were invited to participate in this study. The nursing group of participants was made up of two nurses from hospital management who monitor the daily running of the antimicrobial stewardship programme and six clinical ICU nurses who act as shift leaders and carry out daily infective rounds as part of their antimicrobial stewardship responsibilities. The non-nursing group of participants was made up of a microbiologist, a pharmacist, two anaesthetists, two physicians and two surgeons. The microbiologist was representative of one of the private laboratories that serves the study hospital and is part of the weekly antimicrobial stewardship teleconference held in ICU. The pharmacist was representative of the hospital pharmacy which is responsible for ordering of stock and dispensing of antimicrobial treatment.

### 3.7 DATA COLLECTION PROCESS

Once ethical approval had been granted by UKZN (Annexure D) this was communicated to the nursing manager of the study hospital. The research project was explained and permission was given to the researcher to conduct the study (Annexure E). Permission was also granted for the researcher to meet with the ICU unit manager in order to approach prospective nursing participants who met the inclusion criteria. A letter, including the consent form (Annexure C), was given to each of the prospective participants, both nursing and non-nursing. This contained the information sheet and the contact details of the researcher, the researcher's supervisor, and those of the Biomedical Research Ethics Committee (Annexure B). The purpose of the study was explained in the information sheet which included the conditions under which the study would be conducted in order to maintain privacy and confidentiality requirements. Participants were told that the interviews would be



approximately 30 minutes long and would be conducted in a private room which was to be made available for this purpose. Consent was obtained from 16 health professionals and interviews were booked to be conducted over a 3 week period. One prospective nursing participant declined to give consent and was thanked for taking time to consider being part of the study. Another shift leader volunteered to participate and was welcomed into the study. A prospective non-nursing participant who had given consent to be interviewed, was unfortunately unable to meet with the researcher during arranged interview appointments. No further non-nursing participants were asked to make up this place as by the end of the interview process it was clear to the researcher that data saturation had been reached (Fusch and Ness, 2015).

### 3.7.1 DATA COLLECTION INSTRUMENT

In order to assist in answering the study question of how the role of the ICU nurse in antimicrobial stewardship was perceived by the members of the antimicrobial stewardship team, several core questions (Annexure A) were used in a semi-structured interview to cover the objectives stated earlier in the study and to facilitate discussion around this topic. These predetermined open-ended questions provided an initial focus of attention for both the researcher and the participants, and issues raised by the participants in the interviews allowed the researcher to explore a wide range of topics, further developing them in following interviews (Graneheim and Lundman, 2004; DiCicco-Bloom and Crabtree, 2006; Knox and Burkard, 2009; Doody and Noonan, 2013). Study objectives, based on role socialisation as seen in symbolic interactionism, were to explore the perceptions of the various members of the interdisciplinary team with regards to the role that the intensive care nurse plays in the antimicrobial stewardship programme in this ICU, the role that the intensive care nurse plays in collaboration within this team and how the role of the intensive care nurse can be supported and developed to ensure successful antimicrobial stewardship. Participants were encouraged to speak freely and this allowed the researcher to identify and explore perceptions that were identified by the participants as being relevant to the topic under discussion. The individual interview process allowed participants the opportunity to speak freely. This may not have been possible in a focus group interview in view of the multidisciplinary backgrounds of the participants which may have affected the comfort of some of the participants. However a more experienced researcher might have the skills to anticipate and facilitate the dynamics that might arise from a multidisciplinary focus group interview process.

### 3.7.2 INTERVIEW PROCESS

Interviews were conducted over a period of three weeks in August 2014. All participants interviewed were from the multidisciplinary team of private health professionals who jointly care for patients in this general ICU. Fifteen participants, eight nursing and seven non-nursing participants, were interviewed in private rooms. Fourteen of the interviews were held in the study hospital and one participant requested to be interviewed in an office in another hospital. Nursing participants requested that interviews be conducted during break times and were interviewed in a private room that was made available by the hospital management. Appointments were made with the office staff of non-nursing participants and arrangements were made for interviews to be conducted in these offices in between patient consultations.

At the start of the interviews an opportunity was made for participants to ask questions about the nature of the study. Participants were reassured regarding the confidentiality of their participation and contribution to the study. Permission to record the interview was obtained from each participant. An Olympus digital recorder VN-7600 was used successfully and recorded both the researcher's and the participants' voices clearly. One interview was over 40 minutes long but most interviews were between 20 and 30 minutes in length. All participants were greeted and confirmation made that consent had been given and that the participants were aware of their right to withdraw this consent at any stage of the study (Annexure C). Most participants chose to use pseudonyms to protect their identity when requested to do so. Those who did not were noted by the participant number assigned chronologically to them. All participants appeared comfortable and this may have been due to the fact that the researcher is part of the greater multidisciplinary team in this ICU and was known to the participants.

### 3.7.3 TRANSCRIPTION OF RECORDED MATERIAL

Interview recordings were transcribed verbatim into print. Following completion of each interview the recording was listened to by the researcher as soon as possible. This assisted in 'remembering' and allowed the researcher to start the transcription process. Data analysis and interpretation commenced as soon as transcription had taken place. This occurs simultaneously with data collection in qualitative research rather than in a linear fashion as in quantitative research (Burns and Grove, 2009:507). The transcriptions were made by the researcher reading the interview into a Phillips LFHO625 voice tracer device. The transcription software had been trained prior to the interviews to recognise the researcher's

voice. The printed transcript was then corrected by listening to the interview and correcting word errors and punctuation.

### 3.7.4 DATA ANALYSIS

Several ‘listening, reading and correcting’ periods facilitated familiarisation with the data. Reading continued until levels of data became understood. This is part of the process referred to as ‘immersion’ (Brysiewicz, 2013). Reading was repeated until it was clear that all data was placed into categories and sub categories in order to describe the phenomenon under study (Hsieh and Shannon, 2005; Elo and Kynga, 2008). A process of abstraction followed in order to emphasize interpretation of the data (Graneheim and Lundman, 2004).

TABLE 3.1 DATA ANALYSIS

<i>Meaning unit</i>	<i>Condensation</i>	<i>Categorization</i>	<i>Abstraction</i>
Participant contribution is taken from the transcripts and described verbatim	Participant contribution is paraphrased by researcher	Data is placed in categories, sub-categories and sub-sub categories	This is a process of interpretation by the researcher
<p><i>“Very important role... I mean the intensive care nurse is there, you know, all the time. They are monitoring the trends... they can pick up the little subtle things that happen in change of condition. We’re there twice a day for a short period of time. The ICU nurse is vital in the care of the patient... it’s a massive responsibility...”</i></p> <p><i>Non-nursing participant – Hospital management</i></p> <p>example from transcripts</p>	The doctor feels that the ICU nurse has a large responsibility	<p>Clinical skills</p> <p>Monitoring</p> <p>Advocacy</p> <p>Communication</p> <p>Collaboration</p>	<p>The ICU nurse is in attendance at the bedside of the critically ill patient for 24 hours a day</p> <p>There is continuous monitoring of patient and trends by the ICU nurse in attendance</p> <p>In private healthcare, doctors visit the ICU twice a day to see their patients</p> <p>In private healthcare, doctors are not in the ICU unless called to attend to their patient by the ICU nurse</p> <p>In private healthcare, ICU nurses are responsible for the identification, assessment and communication of changes in the condition of the critically ill patient.</p> <p>In private healthcare, ICU nurses have a “massive responsibility”</p>

### 3.8 ACADEMIC RIGOUR

Qualitative research recognises multiple meanings and is open to the multiple realities of different participants in a study (Searle, 2002; Graneheim and Lundman, 2004). Shenton (2004) refers to this as triangulation and suggests that this is an important issue in the consideration of academic rigour or trustworthiness. Graneheim and Lundman (2004) cite (Guba, 1981; Lincoln and Guba, 1985; Patton, 1987; Polit and Hungler, 1999; Berg and Welander Hansson, 2000) in their discussion of trustworthiness, and note that the majority of qualitative researchers require that four criteria are met in order to demonstrate trustworthiness. These are credibility, transferability, dependability and confirmability. These replace the criteria used to assess validity in quantitative research such as truth value, applicability, consistency and neutrality (Guba, 1981; Morse, Barrett, Mayan, Olson and Spiers, 2002; Searle, 2002).

TABLE 3.2 TRUSTWORTHINESS

PROVISIONS MADE TO ADDRESS FOUR CRITERIA FOR TRUSTWORTHINESS (Lincoln and Guba, 1985; Shenton, 2004)	
<i>Quality criterion</i>	<i>Provision made by researcher</i>
Credibility	Use of Content Analysis as an accepted research approach Researcher familiarity with the culture of the study setting Triangulation by the use of participants from different disciplines Request for participant honesty Member checks of transcript analysis Discussion and review of transcript analysis by more experienced researcher Reference to previous research to frame findings
Transferability	Detailed background data to provide a context for the study Thick description of phenomenon being studied
Dependability	Detailed description of methodology
Confirmability	Triangulation used to reduce researcher bias Researcher use of a reflective page Recognition of limitations of the study Detailed description of methodology Use of audit trail

### 3.8.1 CREDIBILITY

Shenton (2004) describes credibility as confidence in the ‘truth’ of a study. A true description has to be made of a phenomenon which is being studied in order to show credibility (Graneheim and Lundman, 2004). Triangulation is part of showing credibility and was achieved by using a wide range of participants (Shenton, 2004). Individual one-on-one interviews were conducted in order to obtain in-depth data. Each participant was given the copy of their transcript to read and verify that this was a true and accurate record of their interview. Each participant was allowed the opportunity to add further contribution, or to say ‘well I did say that, but what I meant was this...’ Most participants were satisfied with the accuracy of the transcriptions. Two participants pointed out minor errors which were then corrected and two participants offered additional comments. Following this, member checks were carried out with 20% of the participants who were given the analysis of their transcript and asked to read and comment on this. No changes were suggested by the participants. Peer review was conducted in which two other researchers reviewed the data collected in order to provide objectivity and a check on bias.

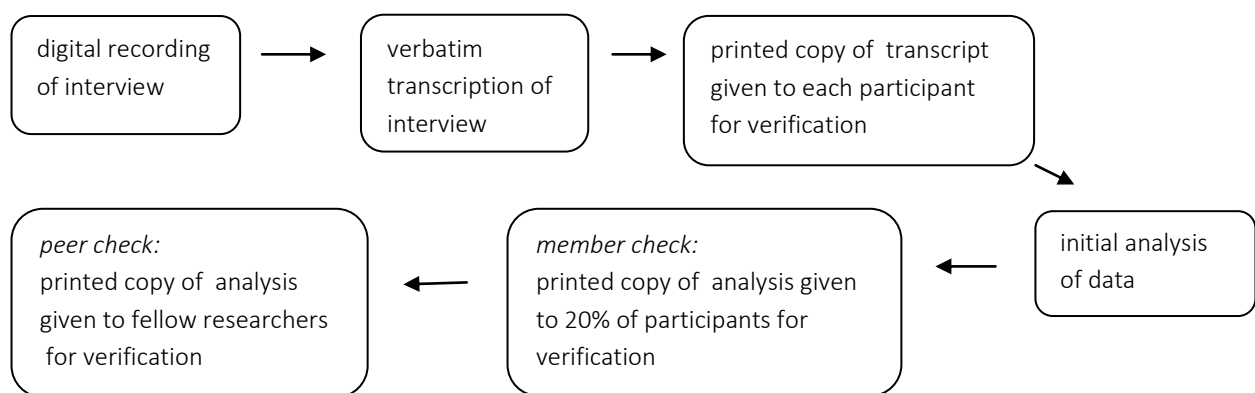


Fig. 3.1 Interview process to ensure credibility

### 3.8.2 TRANSFERABILITY

Transferability can be described as the applicability of the findings of a study in other contexts (Shenton, 2004). The setting, how the participants were approached and selected, and the manner in which the data was collected and analysed within this study have been described in order to provide a ‘thick description’ of the study so that a future researcher can

decide how similar the situation is to another setting and whether the findings can be applied to that setting (Patton, 2002:503; Graneheim and Lundman, 2004).

### 3.8.3 DEPENDABILITY

Dependability is shown when study findings can be replicated by future studies examining the same phenomenon within a similar context (Shenton, 2004). The research methodology of this study has been described and records kept of changes and events in the study.

### 3.8.4 CONFIRMABILITY

Confirmability can be described as the extent that the study reflects participant contributions and the neutrality of the researcher (Shenton, 2004). Written records of dates of interviews and further contact with the participants were kept over the period of the study in order to provide an accurate record or audit trail. Supplementary notes were taken to record any problems that could have occurred, such as equipment failure during the interview. Field notes of the researcher's personal journey were kept as a process of reflection (Searle, 2002). These measures were put in place to show lack of bias and that the findings that emerge from the data are real and 'feel real' (Patton, 2002:552-553). Limitations of the study have also been identified.

## 3.9 ETHICAL CONSIDERATIONS FOR PARTICIPANTS IN STUDY

The research proposal for this study was submitted to the University of KwaZulu-Natal Bioethics Research Committee (BREC) for approval which was granted (Annexure D). Participants were informed about the nature of the study, the name and contact details of the researcher, the name and e-mail contact details of the researcher's supervisor and BREC contact details (Annexure B). A consent form (Annexure C) was given to each participant to allow for written consent to be given for the researcher to interview the participant. This stated that the participation within the study and any data collected would be kept confidential and emphasized the right of the prospective participant to decline to be included in the study, and the right to withdraw from the study at any stage should the participant wish to do so (Emanuel, Wendler and Grady, 2000). Finally, arrangements were made with hospital management and the participants for communication of the research findings on completion of the study (Patton, 2002).

### 3.10 DATA MANAGEMENT

Participants were asked to choose a pseudonym to ensure anonymity and confidentiality of the participants throughout the study. All recordings and transcripts of these recordings are to be used for the purpose of this research study only and confidentiality is to be maintained. Documents relating to the study, such as transcripts and researcher notes, will be kept in a locked cabinet for the duration of the study and for a further period of five years, after which they will be destroyed by shredding.

### 3.11 SUMMARY OF CHAPTER

This chapter described the qualitative methodology used with particular reference to content analysis. It describes the sampling process used to select participants. Healthcare workers, who were part of antimicrobial stewardship in the general ICU in the study hospital, were asked to volunteer and participate in the study. Semi-structured interviews were conducted with 15 participants from different healthcare disciplines. The participant profile of this study was comprised of nursing management, clinical ICU nurses, anaesthetists, physicians, surgeons, a microbiologist and a pharmacist. Methods to ensure academic rigour, ethical considerations and data management within the study have been described.

## CHAPTER FOUR: DESCRIPTION OF FINDINGS

### 4.1 INTRODUCTION

This chapter describes the findings of the study. Major categories have been identified, some of which were predetermined and arose from the study objectives and research questions, and sub categories have been identified within the main categories. Participant contributions have been described within these categories. As significant differences have been found in some of the contributions between the nursing and the non-nursing group of participants, where relevant these responses have been discussed as being representative of a particular group.

TABLE 4.1 PARTICIPANT PROFILE

NURSING PARTICIPANTS		
ICU shift leaders	Day - shift 1	3
	Day - shift 2	3
ICU unit manger		1
Infection prevention and control nurse		1
NON - NURSING PARTICIPANTS		
Medical specialists	Physicians	2
	Surgeons	2
	Anaesthetist	1
Other	Microbiologist	1
	Pharmacist	1
TOTAL PARTICIPANTS		15

### 4.2 PRESENTATION OF FINDINGS

Contributions from the participants made up three major categories:

- i. the nurse's role in the antimicrobial stewardship team in this ICU
- ii. the development of the nurse's role in the antimicrobial stewardship team in this ICU
- iii. perceived barriers to developing the nurse's role in the antimicrobial stewardship team in this ICU

#### 4.2.1 CATEGORIES AND SUB CATEGORIES

According to Morse (2008), a category is a collection of similar things. Elo and Kynga (2008) state that these will be determined by the research question. The 11 core questions used in the interviews provided a rough guide to placing participant responses into categories which resulted initially in many sub categories. This was carried out for each transcript.



During the process of peer review, a fellow researcher suggested the categories be reviewed to assess whether there were some that needed to be merged. Several categories that held similar data were amalgamated and this resulted in three major categories. All the transcripts were then reread, reviewed and re-reviewed to ensure that all data had been considered, that no new categories, sub categories or sub sub categories could be found in the data and that the research question had been answered (Morse, 2008).

#### 4.3 RESEARCH FINDINGS

Interview data resulted in three main categories; the responsibility of the nurse's role in the antimicrobial stewardship team, the development of this role and perceived barriers to developing this role.

- **“A MASSIVE RESPONSIBILITY!”**

This category arose from the discussion with the participants of the nurse's role in the antimicrobial stewardship team in this intensive care unit. Sub categories were;

- the organisational role of the nurse in antimicrobial stewardship
- the advocacy role of the nurse in antimicrobial stewardship
- the clinical role of the nurse in antimicrobial stewardship.
- the collaborative role of the nurse in the antimicrobial stewardship team

- **“BEING PROACTIVE”**

This category arose from suggestions from the participants of how the nurse's role can be developed in the antimicrobial stewardship team in this unit. Sub categories were;

- through nurses taking responsibility for safe patient care
- through further education of the nurse in antimicrobial stewardship
- through improved collaboration within the antimicrobial stewardship team

- **MULTIFACTORIAL BARRIERS**

This category arose from the concerns that participants had of perceived barriers to developing the nurse's role in the antimicrobial stewardship team. Sub categories were;

- resource barriers
- knowledge deficit
- poor staff attitudes
- collaboration barriers
- working in isolation
- economic barriers

TABLE 4.2 CATEGORIES, SUB CATEGORIES, SUB SUB CATEGORIES

CATEGORIES	Sub categories	Sub sub categories
1) The “ <i>massive responsibility</i> ” of the role of the ICU nurse in Antimicrobial Stewardship		
	<ul style="list-style-type: none"> <li>organisational role</li> </ul>	running the AS programme patient documentation data surveillance
	<ul style="list-style-type: none"> <li>advocacy role</li> </ul>	unit advocacy wider advocacy
	<ul style="list-style-type: none"> <li>clinical role</li> </ul>	monitoring for infection infection control giving antimicrobial therapy
	<ul style="list-style-type: none"> <li>collaborative role</li> </ul>	AS team AS nurse’s round doctors’ round AS weekly meetings
2) “ <i>Being proactive</i> ” in the development of the ICU nurse’s role in Antimicrobial Stewardship		
	<ul style="list-style-type: none"> <li>taking responsibility</li> </ul>	self-determination patient safety evidence-based practice
	<ul style="list-style-type: none"> <li>further education</li> </ul>	involvement in AS rounds/ meetings in-service teaching
	<ul style="list-style-type: none"> <li>improved collaboration</li> </ul>	nurses as part of the AS team team communication
3) Multifactorial barriers to the development of the ICU nurse’s role in Antimicrobial Stewardship		
	<ul style="list-style-type: none"> <li>resource barriers</li> </ul>	no time in to teach/learn lack of experienced nurses shortage of ICU nurses in SA
	<ul style="list-style-type: none"> <li>knowledge deficit</li> </ul>	poor understanding of infection control poor understanding of antimicrobial therapy
	<ul style="list-style-type: none"> <li>poor staff attitude</li> </ul>	poor attitude to work poor attention to detail lack of self-determination choosing the right staff to work in ICU
	<ul style="list-style-type: none"> <li>collaboration barriers</li> </ul>	nurses not involved in decision-making process nurses’ perception of doctors’ dismissive attitudes doctors’ lack of confidence in nurses in ICU doctors’ poor communication with enrolled nurses doctors’ frustration shown by their choice of language
	<ul style="list-style-type: none"> <li>working in isolation</li> </ul>	poor AS teamwork lack of doctor support for AS lack of pharmacist support for AS
	<ul style="list-style-type: none"> <li>economic barriers</li> </ul>	lack of an intensivist to run the ICU inadequate nursing staffing inadequate pharmacist staffing pressure from medical aids to use generics

#### 4.3.1 THE “MASSIVE RESPONSIBILITY” OF THE ROLE OF THE ICU NURSE

Participants found that the ICU nurse had four main responsibilities within the antimicrobial stewardship team; the organisation of the antimicrobial stewardship programme in accordance with evidence-based antimicrobial stewardship principles, advocacy of patient care with respect to optimal antimicrobial therapy, identification of changes in the patient's clinical condition and communicating these changes to other members of the antimicrobial stewardship team.

##### 4.3.1.1 ORGANISATIONAL ROLE

Nursing participants shared how the antimicrobial stewardship programme was started in the general adult ICU of this newly built hospital. Management of laboratory reports and documentation was seen to be important by both nursing and non-nursing participants. Collection of antimicrobial stewardship data for surveillance purposes was also identified as an important aspect of stewardship by nursing and non-nursing participants. All the nursing participants were aware that a stewardship programme had been started in the ICU by nursing management and thought that this was an important initiative although this concept was new to all but one of nurses participating in the study.

*We have probably been going for a good two years, 18 months... two years. (Nursing participant)*

*I sort of started it off and it is growing nicely because we have got the staff aware. Initially there was absolutely no awareness of antibiotic stewardship amongst the registered nurses that started. And I think that this was maybe because they were all from different hospitals and maybe they didn't really know about... and it was also a new thing, I think... and so we had to explain to them what we're doing and get their buy in into it. (Nursing participant – Hospital Management)*

*The first time I ever heard of it was when [lab member] from [private lab] introduced herself. It was here before we opened... and she spoke about antibiotic stewardship and I had no clue what she was talking about. And she explained it to me and we just basically decided to do our own thing. And we got the monitors from them... the forms... and we have just been doing it. (Nursing participant – Hospital Management)*

The administrative aspect of documentation of clinical changes and treatment, laboratory results and the filing of reports was seen by nursing participants to be part of the ICU nurse's role generally in ICU but particularly in antimicrobial stewardship in order to facilitate access to information.

*What I expect of them is to do the daily rounds, preferably in the morning after the doctor rounds. Just what we normally do is we check your patients' infection markers... If it was done that day. You write all your results in and then you also write the antibiotic, the name, the dose, the strength and how often it gets given... I want them to monitor all that. (Nursing participant – Hospital Management)*

Surveillance of organisms was mentioned as an important aspect of antimicrobial stewardship by a nursing participant. A non-nursing participant who had been monitoring surveillance data had seen interesting changes in patterns of resistance and felt that the stewardship programme in this unit may be making a difference.

*It gives you every single organism that that was identified or detected at this hospital on a monthly basis. (Nursing participant – Hospital Management)*

*But our ESBL rates... I have to check properly... but I just scanned through some of the susceptibilities... And I see there is less of Rocephin use which may be causing a decrease in ESBL rates, especially amongst the Klebsiella's. But I have to go deeper into it... but I just looked at it and it seemed interesting I think, you know, because of the awareness of antibiotic stewardship we are seeing some trends decreasing in Klebsiella and the ESBL rates are decreasing. (Non- nursing participant)*

#### 4.3.1.2 ADVOCACY ROLE

Patient advocacy was seen as very important by the nursing participants. All participants said that antimicrobial stewardship is an initiative that protects the ICU environment and addresses the challenge of bacterial resistance and the problem of antibiotics becoming a scarce resource. All participants expressed concern regarding inappropriate antimicrobial treatment within ICUs. Non-nursing participants promoted the correct choice of antibiotics and antifungals according to antibiograms and emphasized the importance of de-escalation. Nursing and non-nursing participants were concerned about the unnecessary use of antibiotics within the primary healthcare area and felt that this contributed to antimicrobial resistance. Nursing participants understood that antimicrobial stewardship is a proactive endeavor to monitor antibiotic use; to ensure that antimicrobials are targeted at the correct infections with the use of broad spectrum agents initially until cultures indicate otherwise and that antimicrobials are given for the correct duration and stopped when necessary.

*I know that the doctors are busy... so we the nurses, we are the patients' advocates. (Nursing participant)*

*Talking on behalf of the patient... Making the initiative to actually do something for them... you know... for the patient... So we're acting on behalf the patient, telling the doctor. 'Look... this is what bug the patient's got and this is what antibiotic can be given'. So ja... that's... we are talking on behalf of the patient. (Nursing participant)*

*I see it as a nurse's role... or part of a nurse's role to actually make sure that the correct antibiotic is given to the patient... That it is given at the correct time so that we don't develop a case where there is resistance. (Nursing participant – Hospital Management)*

Participants noted that promoting the correct choice of antimicrobial therapy was important in the management of infections in the critically ill patient.

*First, use antibiotics where it's really indicated... or where there is a clear indication. Use the correct antibiotic if you... Depending on how well you understand the infection, start with a broad-spectrum initially and timeously get the right cultures available... In other words... tracheal aspirates... aspirations... and MC&S's. And adjust antibiotics to that resistance profile as soon as you can. And stop antibiotics when... That I would consider a good stewardship... (Non- nursing participant)*

*Well, it's to protect your ICU. If you don't do this, you sit with a nasty ICU with infections that you don't want. (Non-nursing participant)*

De-escalation was noted by participants as an important aspect of antimicrobial management however a non-nursing participant suggested that de-escalation was not used effectively in this ICU.

*And if, you know, a nurse focuses your attention that today we need to change the antibiotic... instead of seeing it two or three days down the line... (Non- nursing participant – Hospital Management)*

*Once the report, or the specimen results, is back... Looking at the sensitivity report, the antibiotic is either changed to a more specific antibiotic or the doctor might consult with the microbiologist and ask what's the best option of antibiotic for that patient. (Nursing participant – Hospital Management)*

*I think, where we fall short is that we don't de-escalate the use of that quickly enough... if we find that there is a bacteria that has been cultured that is sensitive to a lesser antibiotic. (Non-nursing participant – Hospital Management)*

*... for example if you... you're aware that the antibiotic's been... been given for 14 days. And then you say to the doctor... 'Doctor, you've been giving this antibiotic for 14 days, do you want to continue'... and he says... 'Yes. Continue'. You kind of like to know why... because 14 days is a really long time on one antibiotic... and if the patient's not better...*

*why would you continue. (Nursing participant)*

*... you will see patients on day 8, day 9, day 14, and that's when we say to the doctor... 'This antibiotic, we've been doing it for 14 days'... and 'oh, maybe we need to look at stopping it, maybe we need to look at changing it'... and that sort of thing. (Nursing participant)*

Non-nursing participants expressed concern about the inappropriate use of antimicrobial therapy in the ICU which they felt could lead to resistance in the patient and in the unit.

*I think... I think that the biggest challenge is obviously antibiotic resistance... abuse of antibiotics and inappropriate use of antibiotics. We are all aware that antibiotics are overused and I think also badly prescribed... We often prescribe very effective antibiotics without really having much idea what we are treating and that leads to bacterial resistance... which leads to, you know, leads to morbidity and mortality. (Non-nursing participant)*

*There is a big problem with the superbugs, especially in the specialised units... that we see multidrug resistant escape organisms. (Non-nursing participant)*

*If I have someone in an ICU, that's there for longer than a week. The kind of infection that I expect is a very resistant bug which puts me immediately in the class of Carbapenems, as a result. (Non-nursing participant)*

*We use all the very broad-spectrum antibiotics throughout an admission, which would lead to resistance patterns that are typical in ICU's and with more.... more vicious hospital-acquired infections as a result. All these ESBL scenarios... (Non-nursing participant)*

*I think we need to address the problem... I don't think it's a problem at the moment [in this unit] but it's going to become one in the future if we abuse antibiotics and we don't use them appropriately... You can't... you can't put every patient that comes to the hospital on Imipenem. I mean it's just not the right... And that's what we are doing... (Non-nursing participant)*

*I see a lot of the Carpenems being used, which is your Meronem...not so much the Ertapenems... but... Meronem. (Nursing participant – Hospital Management)*

*Candida* was identified by a non-nursing candidate as an increasingly common infection in the intensive care arena due to poor antimicrobial management.

*... we're seeing an increasing trend of Candida infection and even amongst the Candida... the resistance is increasing. And this is all because of the inappropriate*

*choices, the inappropriate duration, the inappropriate combinations of antibiotics that's also tending towards the increase of resistance. (Non-nursing participant)*

Participants expressed their concern that antibiotics have become a scarce resource and that this is presenting a challenge to the care of patients. Bacterial resistance to antibiotics was seen as the main factor in the decreased choice of antibiotics. The cost of research and development of new agents was seen as another contributing factor.

*Well, we're running out of antibiotics. There's no new antibiotics that have been developed in the market so the resistance is increasing and our choices are limited. So we really have to preserve the antibiotics that we have left to treat these patients with. (Non-nursing participant)*

Both nursing and non-nursing participants were concerned about the overuse of antimicrobial agents in the greater community.

*You know in GP's rooms they actually hand out tablets too easily to the patient. Very often to... you know things are an inflammatory reaction and then they treat them with an antibiotic... (Nursing participant)*

*That's the major issue that we're dealing with... is the inappropriate use of antibiotics. It starts with the GP's ... that's where... it's a major problem... It's where it starts... You know, you go to the GP with flu and it's a viral infection and they end up with an inappropriate... with a broad-spectrum antibiotic. (Non-nursing participant)*

*Even in the recent papers there was an article saying... the overuse of antibiotics... And I'm sure in other countries... where I've spoken to other nurses who have been abroad and stuff... and they say antibiotics is the very last thing that that they would put a person on if they know... if they didn't need it and, you know, for us, we say... I got the flu... oh antibiotics. Whereas someone else in other parts of the world, they say... got the flu... try and work it out... take normal precautions... like your soups, staying at home, covered up and like the Panado for the fever. Not straight wham bam antibiotics. (Nursing participant)*

#### 4.3.1.3 CLINICAL ROLE

Clinical duties of the ICU nurse in antimicrobial stewardship were identified by the participants as the assessment of the patient for signs of infection, the taking of specimens for MC&S and infective markers, the monitoring of laboratory results, the administration of antimicrobial therapy and infection prevention and control. Continuous monitoring of the patient for any changes was seen by participants as an important aspect of the role of the ICU nurse in antimicrobial stewardship. The task of monitoring of laboratory reports such as

infective markers was also seen by participants as an important part of the ICU nurse's daily antimicrobial stewardship responsibilities in the care of the critically ill patient.

*...to know that the nursing personnel are watching the trends... you know, the clinical trends, in the patient. Whether it is the lab or the clinical parameters... so if the patient is deteriorating we have... we would have the early alarm system. So it helps tremendously, you know, in improving patient care. You know, you probably realise that in the patient if we delay antibiotic therapy... fatality increases... (Non-nursing participant)*

*We keep a track of the patient's vital signs so we have an idea of the trends. If the antibiotics are not helping... obviously... obviously there will be an escalation in vitals with the temperature going up, blood pressure, heart rate... And their... also their white cell count, PCT and CRP as well going up. So it's a good indication of whether or not an antibiotic is helping or not... (Nursing participant)*

Participants identified the importance of the ICU nurse conducting investigations to establish baseline data on admission of the ill patient to the unit. This was done by taking specimens for microscopy, sensitivity and culture (MC&S) on insertion of a urinary catheter and on intubation with an endotracheal tube. This baseline information was seen by nursing participants as very important in the identification of hospital-acquired infections. A non-nursing participant identified the importance of specimens in order to find the source of the infection.

*... like for example, patients going to theatre or coming back from theatre, or any patient that's come from the ward... that has a catheter. Or any patient that we admit and catheterise... we do send the urine for an MC&S to the lab. So... that for example, will indicate whether or not... if they are growing a UTI. If they had it prior to coming to us, so that... so we are... And tracheal aspirates... we are trying to do that as well... on intubation and that. So hopefully we will be able to establish whether or not they grew the bug with us... or not... (Nursing participant)*

*Well, you know, in a septic patient we try to emphasise that the focus of infection must be looked for. And..., you know, if for example the patient has a pneumonia and we don't have an endotracheal aspirate and we only have a blood culture... then the yield in the blood culture is very low. So we actually look for the focus of sepsis... So, in a patient if there is no septic focus... and then we need the trapped specimen and... and the urine and the blood culture. (Non- nursing participant)*

Although the laboratory technicians were acknowledged as taking actual samples, the ICU nurse was seen as important by the participants in identifying situations in which blood



cultures should be obtained. This however was seen by nursing participants to be a task that needed to be discussed by the ICU nurse with the doctor looking after the patient.

*...if a patient becomes pyrexial... Above, obviously above 38... 38.5, you start thinking blood cultures. But we have to ask one of the shift leaders first, you can't just do the blood cultures... or the doctor involved, saying, 'the temp is this... do you want blood cultures?' You can't just do it on your own. (Nursing participant)*

Both nursing and non-nursing participants emphasized the importance of the ICU nurse documenting and filing laboratory results correctly, to ensure that relevant information was readily accessible.

*Once the report or the specimen results is back... Looking at the sensitivity report, the antibiotic is either changed to a more specific antibiotic or the doctor might consult with the microbiologist and ask what's the best option of antibiotic for that patient. (Nursing participant – Hospital Management)*

The ICU nurse was identified by participants as playing an active part in the prevention and management of infections in the critically ill patient. This was described as general infection control measures in the prevention of hospital-acquired infection, the careful management of invasive lines and compliance with hand washing. Daily checks on bundle compliance were carried out by shift leaders.

*...we go onto bundle compliance. Okay, we have 'Best Care, Always'... we go under different types of headings. We look at the patients, at the lines that they've got; the central line, the urinary catheter, the peripheral line or arterial line. How many days it is and how many days it should... at what day it should be changed and was it changed. And if it wasn't changed... we need to do something about it. (Nursing participant)*

Ventilator-associated pneumonia was identified by nursing participants as a common hospital-acquired infection in the unit. The endotracheal tube with an aperture for sub-glottic removal of oropharyngeal secretions was seen by the nursing participants as an important intervention.

*...is intubated with a subglottic ET tube and... There is a continuous suction of the patient... to prevent the secretions from going down into the lungs. To try and prevent a pneumonia... (Nursing participant)*

Participants discussed the importance of ICU nursing staff adhering to the principles of infection control in the ICU. Hand washing was seen by both nursing and non-nursing

participants as the basis of infection control measures.

*Ja... as you well know... the hand wash is probably more important in this whole game... (Non-nursing participant)*

*... when you come to work, when you go to tea, you should wash your hands and when you come back from teas and lunches, wash your hands. In between patients, you should wash your hands. It's such a basic thing... and it is so important. (Nursing participant)*

*...universal precautions are very important... and they are the ones doing it. Fortunately they work with one patient only, but I can imagine if you quickly have to do something for the patient next door, you actually need to unscrub, unglove, wash and go to the next one. And that is important because that is how antibiotic resistance spreads as well. And the example there would be Clostridium difficile. When you're cleaning excrement, that patient might be asymptomatic but might have the bug, and... if you don't wash properly between patients, the patient on the next bed can get it. (Non-nursing participant)*

Nursing participants identified the ordering of antibiotics and the timely and correct administration of the antimicrobial therapy as an important role of the ICU nurse in antimicrobial stewardship.

*...making sure that the frequency... the dose interval is done correctly... And it is strict 8 hourly, 12 hourly or whatever. The prescribed time, that is very important in stewardship also... because you can create resistance by not carrying out your frequency correctly. (Nursing participant)*

Nursing participants mentioned that a supply of antibiotics is kept in the unit in order to give the first dose of antibiotic as quickly as possible to reduce the 'hang time'.

*There is a drive on at the moment about our hang time from prescription to antibiotic and we are trying to get that to under an hour... (Nursing participant)*

*Well, I know that we now have that... we now have that box with all... like, a dose of almost every antibiotics... So I sure that... that helps the pharmacist because it... We can give our first dose... on time... It's an antibiotic... it's a box that we keep... Like we keep a ward stock of antibiotics... so that we... If the doctors prescribe something... we are able to give it within the hour that it's being prescribed... Because of the difficulty with the pharmacy card turn around... and things like that... (Nursing participant)*

#### 4.3.1.4 COLLABORATIVE ROLE

Participants said that the ICU nurse was an important member of the antimicrobial stewardship team. A nursing participant described the antimicrobial stewardship round carried out by nurses in charge of running the shift. Participants discussed the daily doctors' round as a useful time for assessing patients' needs and planning care. Participants felt that the weekly teleconference meeting was an important aspect of the antimicrobial stewardship programme.

*Very important role... I mean the intensive care nurse is there, you know, all the time. They are monitoring the trends... they can pick up the little subtle things that happen in change of condition. We're there twice a day for a short period of time. The ICU nurse is vital in the care of the patient... it's a massive responsibility. (Non-nursing participant – Hospital Management)*

Nursing participants mentioned that the daily nursing antimicrobial stewardship round was an important part of the programme. Channels of nurse-to-nurse communication in this ICU were reported as hierarchical in nature.

*The floor nurse, who is looking after the patient... she's got to make sure that the records on her charts are up-to-date and that the lab records are in good nick in the file. So it starts from the floor nurse. Then it goes to the team leader on the floor. She does a round... on all the patients and she updates, you know, picks up... any problems... if there's a problem with the patient. And then it goes to the manager of the unit and then the doctors always are in contact with what's going on because they see the patient on more than a daily basis. (Nursing participant)*

The nursing participant who had previously been part of antimicrobial stewardship described the experience of the doctors' round with the antimicrobial stewardship team.

*... in the UK hospital where I worked, the doctors rounds were done by everybody. So there was a surgeon, the nurses, the shift leaders, the microbiologist. And, they all come together and look at the patient holistically and talk about it... discuss and make decisions. So I think, definitely there would be probably more... more sort of... ja... looking after antibiotics. Just because they were... everybody was more hands-on often. I think... definitely... (Nursing participant)*

A non-nursing participant felt that the doctors' daily visit to the patient was important to review antimicrobial therapy and laboratory reports.

*... every day... on your ward round, you should actually review the cultures that became*

*available. You should keep records of how long lines have been there and you should be, on a daily basis, looking at the script. Just pick up the script and look which antibiotics are there... for how long they have been given. Have they been given? That's my part and I'm sort of playing policeman on the day-to-day management. Not only to decide which drugs, but are they actually going down? (Non-nursing participant)*

The role of the ICU nurse in communicating information during doctors' rounds was identified by most participants as an important part of stewardship. Nursing participants saw these rounds as the best opportunity to discuss their patients.

*Well, communication is very important. You know, a nurse is an important part of the ICU and they are there the whole day. They are not just there on ward rounds. But very important the handover that happens between shift change, but also between the doctors... I might not be aware that Dr number one, that was there half an hour before me, may have actually written up a certain antibiotic after he spoke to a microbiologist. And that... if the nurse doesn't tell me that... I may miss that. So for communication they are important, for source control they are important, for making sure the actual antibiotic is given they are important... because, let's be honest, they do the actual work. (Non-nursing participant)*

The unit manager, the infection control coordinator and the microbiologist were identified by nursing participants as being present at the weekly teleconference meeting. Participants felt that this provided an opportunity to discuss infection control issues within the unit as well as specific patient cases.

*Dr [microbiologist] from [private lab]... we try to have a weekly meeting, it doesn't always happen. But, during that meeting we do a case discussion, so we will talk about that patient, the clinical picture of the patient, together with the laboratory results, what antibiotic the patient is on... what other therapies involved with the patient. And we talk about infection control practices as well, like isolation of the patient and hand washing and so forth. (Nursing participant – Hospital Management)*

*We phone Dr [microbiologist] and Dr [microbiologist] and then we discuss each patient on speakerphone. And then we discuss each patient and give them a bit of background, give them the infection markers, the lines and what they have got in, how long they'd been intubated, their vital signs... are they getting better or not, and they have... they normally give us a lot of advice and... They then say repeat PCT or do a fungitell, or send off another culture... or the line needs to come out. And we normally just suggest it to the doctor and then we take it from there. (Nursing participant – Hospital Management)*

#### 4.3.2 “BEING PROACTIVE” IN THE DEVELOPMENT OF THE NURSE’S ROLE

Development of the ICU nurse’s role in the antimicrobial stewardship team was seen to be possible through the nurse taking responsibility for safe patient care, through education of the nurse with regard to the principles of antimicrobial stewardship and through improved collaboration with the antimicrobial stewardship team.

##### 4.3.2.1 TAKING RESPONSIBILITY FOR SAFE PATIENT CARE

A non-nursing participant felt that a shift in doctor/nurse roles was happening. Another non-nursing participant said that self-determination was key to nursing self-development. Both nursing and non-nursing participants said that the ICU nurse had a responsibility to act proactively within the antimicrobial stewardship role. This related to communication with doctors regarding changes in the patient’s condition, antimicrobial therapy, and correct administration of antimicrobial medication. Nursing participants referred to evidence-based practice such as ‘*Best Care, Always*’. A nursing participant felt that present healthcare workers have a responsibility to future healthcare workers.

*... it is our responsibility as medical staff, who are around now...to ensure that we are not handing over something that is totally uncontrollable to future generations of medical staff. That we are solving problems not creating one... (Nursing Participant)*

A non-nursing participant identified a shift in the doctor/nurse relationship as an interesting development in team dynamics.

*Traditional doctor/nurse roles... You know... the nurse came a long way. In the old days, probably they... their education was a basic one, that in the past decade or two it became quite a science, and there is quite an overlap between doctor and nurse, even in the teaching schools. So there... there is going to be a new paradigm shift on basically which role they are going to play in management and in advice. (Non-nursing participant)*

A non-nursing participant felt that ICU nurses needed to recognise that self-development was integral to improving nursing practice.

*... it’s all about self-development at the end of the day. (Non-nursing participant – Hospital Management)*

*... I think it’s the integral... do I want to do it...? Do I want to better myself...? Do I want to understand...? (Non-nursing participant – Hospital Management)*

A nursing participant felt that all nurses working in ICU should actively contribute to antimicrobial stewardship. A non-nursing participant identified engagement with doctors as part of the ICU nurse's responsibility in antimicrobial stewardship.

*I think more commitment from all staff regarding antibiotic stewardship because... it is not just a handful of peoples' role. It is every bedside nurse's role. (Nursing participant)*

*I think it's... when it comes down to responsibility. I mean, if it's your patient... it's your patient as well... If the patient has been on a certain antibiotic for two weeks... and then I think it's your responsibility to ask... 'this patient has been on this for two weeks... is it still appropriate to keep them on this? Can't we stop it or change it... can't we switch it' or 'the MC&S showed this'... whatever the case may be... It's your responsibility as well... (Non-nursing participant)*

Participants said that changes noticed by the ICU nurse should be communicated to the specialists caring for the patient. Nursing participants felt that ICU nurses needed to behave proactively when noting changes in laboratory results or the patient's clinical condition.

*They should be picking up the phone and say 'Listen Doctor, you were here this morning... the results have now come through and there's something.' (Non-nursing participant – Hospital Management)*

*You, as the nurse, have to say 'Doctor, have you seen this'... and if you didn't tell him it won't be treated. (Nursing participant)*

*And liaising with the doctors where we can, you know, to update them on changes to the inflammatory markers and update them on culture results as we receive them because they... they are not always aware of the positive cultures... the doctors. (Nursing participant)*

*So they've got not only to write it down but actually to have some input in it as well. We are still getting there, I think. I don't think hundred percent proactive but it's much better than it was. But ja... to just not only to write down... to sort of have some insight into it. Why I am doing it? What can I do to help? You know, that kind of thing. (Nursing participant – Hospital Management)*

*So, if we work as a team and if the nurse picks up early that this patient is deteriorating... we have to act... and there is an early warning system... so in that way, you know that nurses are empowered. They understand more about sepsis in the patient. Whether the patient is improving/deteriorating... they understand what lab tests to do in that particular case... Clinically they think that that patient is deteriorating? And then they liaise with the clinician as well and we liaise with the clinician as well. (Non-nursing participant)*

participant)

*Well... I think that the nurse has a lot... has a lot to say. Yes. Because if we... if we don't come across the culture results... we're the ones like... usually, like most of the time... pick up the culture results. Because it comes from the lab to us and we, the nurse, are the first ones to see it and we'll say... we'll point it out to doctor. 'Look... this is what was cultured... Doctor, have you seen this... and it does say that the patient is resistant to whichever antibiotic... and the patient's is on it'. Or we actually give the doctor a call... some of us we do take the initiative... to phone the doctor and to say... you know what, the patient is resistant to this one, for example antibiotic A and he is sensitive to antibiotic B... and he's cultured that, that and that. What antibiotic can we use?' So yes... we do play a very important role when it comes to antibiotics and ja... antibiotic stewardship and actually finding out... and having something to do with it because the doctors do rely on us a lot. (Nursing participant)*

Participants identified improving the ICU nurse's ability to read and comprehend reports as important.

*The different types of infection markers and bugs... you know we put on different antibiotics to deal with all those sensitivity and because some nurses don't know what that means... sensitivity. (Nursing participant)*

Nursing and non-nursing participants felt that ICU nurses should be careful to prepare the medication correctly.

*...certain antibiotics you have to give regularly and certain ones you have to give over a prolonged period... so the nurses' function is to make sure that the correct antibiotic has been given and it has been correctly given. (Non-nursing participant – Hospital Management)*

*I think that we should, as nurses, we could focus a little bit more on how we mix things. Because I think we... Everyone likes a 50 ml bag sometimes... so we don't really pay too much attention when we should be. Or, for example... if the doctors would write a correct order as to giving the antibiotics... that they need diluting... that they would correctly write what they must be diluted in. I know they say they don't have time but actually it is their responsibility... isn't it...? In the same breath it's ours to know what exactly to mix it in... (Nursing participant)*

Nursing participants referred to bundles within the 'Best Care, Always' infection control campaign used to guide nursing practice in this ICU.

*... we go onto bundle compliance. Okay. We have 'Best Care, Always!'. We go under*

*different types of headings... We look at the patients, at the lines that they've got; the central line, the urinary catheter, the peripheral line or arterial line. How many days it is and how many days it should... at what day it should be changed and was it changed. And if it wasn't changed... we need to do something about it. So... that is with regard to the line changes. Then we'll get the other things like we look at their ventilator-acquired pneumonia and the patient's chest x-ray when they first came to hospital and the most recent one. We see... changes... we look at the differences... in... Has the patient developed ventilator-acquired pneumonia since he's been in hospital? So there's a lot of things we look at, besides the lines, the VAP... Surgical site for example... we look at the wound, if it's healing... if there is any redness around there. When the person last did the dressing and what was the wound looking like. If a pus swab was taken. (Nursing participant)*

#### 4.3.2.2 FURTHER EDUCATION OF THE NURSE IN AS

Education was identified by both nursing and non-nursing participants as an important part in supporting the development of the ICU nurse's role within antimicrobial stewardship and general nursing knowledge and skills. The working environment was identified by non-nursing participants as important for providing opportunities for learning. Participants felt that ICU nurses should be involved in the antimicrobial stewardship programme in order to raise awareness of the importance of monitoring for signs of infection and the challenges of managing resistant infections. In-service training was identified as a useful way in which ICU nurses could be informed about antimicrobial stewardship. Nursing leadership was seen by non-nursing participants as being important in providing an environment that supports learning as essential for the development of the ICU nurse.

*...you can only be as good as your mentor, I used to say... If you have a mentor that's progressive and forward thinking, I think your student will be as well. (Non-nursing participant)*

*...allowing opportunities... but then from management, you know, to send, you know, a member of.... You know, we're all interested in antibiotics stewardship... So if we have to engage with somebody, you know, it's like a learning organisation... So no one is afraid to ask and no one's afraid to... Yes... allowing the nurse to be empowered. Not just the... you know, the nurse to record and just to, you know, to feed the patient. The nurse is also educated and has a certain amount of knowledge and can contribute towards the patient care. So we all have to be empowered... (Non-nursing participant)*

A nursing participant suggested that a nursing teaching round could be initiated which would allow ICU nurses on the floor to be more involved and would facilitate awareness of the antimicrobial stewardship programme. A non-nursing participant said that it would be useful



to get the infection prevention and control nurse to involve the ICU nurses in the antimicrobial stewardship initiative.

*A teaching round would be awesome. If you can have an antibiotic teaching round every morning, at say 11, we could go from patient to patient, like we do with the difficult ones, the ones that are on 'vents' and have got some septic focus or anything like that. I think that would be awesome. (Nursing participant – Hospital Management)*

*...each nurse can basically tell about their patient, can summarise the patient... how long it'd been, what is happening... I think that would be a very good idea. We can do maybe do... say two or three patients a day. Don't have to do all of them but it would create more awareness and makes it more interesting. Because then they don't just come and do the basic stuff... they actually have some understanding. (Nursing participant – Hospital Management)*

*... get the nursing staff involved, especially the ICU nurses. We do have an infection control nurse that we should involve. (Non -nursing participant)*

A non-nursing participant suggested that ICU nurse interest in antimicrobial stewardship could be encouraged by making opportunities for the ICU nurses to attend the weekly teleconference antimicrobial stewardship meeting in the unit and by improving communication within the unit regarding the antimicrobial stewardship programme.

*So the weekly meetings are very important because we then all speak the same language and you get trained on the job. (Non-nursing participant)*

*When we do the phone call on Friday to the pathologist... to involve them as well... to get them to sit in and listen to what we're discussing and maybe they will get more confident. (Nursing participant – Hospital Management)*

Nursing participants identified in-service training in antimicrobial stewardship as being a useful way of ensuring that ICU nurses are well informed about bacterial resistance, antimicrobial therapy and monitoring requirements. Present in-service training was identified as being carried out by pharmaceutical company representatives.

*They go around lecturing everybody, you know, all these drugs... Tazocin and all these things... because they have had plenty of training at their firms to really understand a drug and side effects... contraindications, all that... they know that. (Nursing participant)*

Both nursing and non-nursing participants supported formal training as a means of developing the knowledge and skills of the ICU nurse. Participants said that it was important

to improve the ICU nurses' knowledge of antimicrobial agents and their usage, awareness of infection in the unit and the possibility of hospital-acquired infections. A non-nursing participant suggested that a short course of training on antimicrobial therapy may be helpful for nurses working in the ICU.

*Why are you giving Invanz here and Meronem there... Augmentin there... and [inaudible] there... Well, this one has got an abdominal infection here... This one's got a chest infection... that one's got... (Non-nursing participant – Hospital Management)*

*...know her drugs... know her antibiotics... that's the thing. Mainly from the pharmacy point of view you should do that training as well. It's not like you have to take a whole range of antibiotics. Do a whole course and that... Just the antibiotics that we are using... these are the ones that we are using... I think specifically those... (Non-nursing participant – Hospital Management)*

#### 4.3.2.3 IMPROVED TEAM COLLABORATION

Participants felt that improving aspects of the antimicrobial stewardship team would assist in the development of the ICU nurse within this initiative. A non-nursing participant said that it was important to acknowledge nursing interest and commitment to antimicrobial stewardship and that the ICU nurse needed to be aware of the importance of this role. Another non-nursing participant underlined the value of everyone working as a team. Participants identified communication as important to effective teamwork

*It's ongoing education and experience... we've got a lot of people... we've got fantastic nurses and they're good. They don't all have a big experience... You know... that comes with time. And I think that, what nurses need to be taught, is the importance of their role in the whole team. That's... maybe sometimes, where they're neglected. (Non-nursing participant – Hospital Management)*

A non-nursing participant felt it was important to work as a team.

*I think if there is a strong antibiotic stewardship team in the hospital and, you know, if there is, you know... an understanding that each person in that team is important. So if the doctor doesn't worry about ego and everyone is trained on sepsis and... if everyone understands that, you know, we are all here to do the best for the patient. (Non-nursing participant)*

Most participants identified effective communication skills as integral to successful collaborative teamwork.

*I think it's very important to... to be able to communicate, because you need the ability to explain... explain... you know, why you're saying whatever you are saying... So you need that ability to explain and communicate with the doctor or the microbiologist, pharmacist or just even the nursing staff in the department. (Nursing participant – Hospital Management)*

Most participants described situations where the microbiologist was consulted by the doctors for advice by telephone.

*...you know, doctors even phoning the lab and speaking to the microbiologist and saying... 'You know what... I'm worried about this patient... his temperatures are not coming down, PCT's climbing and, you know... All this is climbing... we still haven't got results back from our cultures... What do I do...? I'm treating with this... I suspect it's that... but I'm treating with this for now... What... what is your advice? (Nursing participant)*

*The microbiologist is a very informed person in terms of decision-making and I will often phone them and ask them... 'Look we've cultured this... what do you think we should use?' (Non-nursing participant – Hospital Management)*

#### 4.3.3 MULTIFACTORIAL BARRIERS TO DEVELOPING THE NURSE'S ROLE

The main barriers to developing the ICU nurse's role in the antimicrobial stewardship team were identified by the participants as; resource barriers, knowledge barriers, proactive nursing barriers, collaboration barriers, barriers from working in isolation and economic barriers.

##### 4.3.3.1 RESOURCE BARRIERS

Participants identified barriers to the development of the nurse's role in antimicrobial stewardship as poor basic nursing training. They also said that in-service training was difficult to carry out because the unit was always busy. Both nursing and non-nursing participants felt that nurses are being used in ICU who do not have the required experience to work there.

*I think that there is a lack of education... I think there's big gaps in the training today and I think we are using a lot more staff that don't have the correct level of experience to be in an ICU. It's just a sign of the times and... I think its training. Overall it is not what it used to be... (Nursing participant)*

A non-nursing participant said that inexperienced nurses are a problem in the private

healthcare sector.

*I think that the problems in the private sector... and I don't know what it's like in the province... Certainly in the private sector, we have a lot of inexperienced nurses. (Non-nursing participant – Hospital Management)*

Both nursing and non-nursing participants were concerned at the lack of trained ICU nurses working in the intensive care unit.

*We don't have... I mean, I don't even know how many of these nurses, that I work with in ICU, are actually properly ICU trained...? And, you see... And obviously... so therefore, I suppose, my expectation is not particularly high... I don't expect very much. A good ICU trained nurse can that add valuable... add huge value to patient management... (Non-nursing participant – Hospital Management)*

#### 4.3.3.2 KNOWLEDGE DEFICIT

Barriers to the development of the nurse's role in antimicrobial stewardship were identified as the ICU nurse's lack of knowledge of infection control measures and of correct ways to administer antimicrobial therapy. ICU nurse knowledge of causal factors relating to ventilator-associated pneumonia was identified as a concern by one of the nursing participants.

*...we have had incidences... or should I say... concerns raised about that... so I think it's a good place as a starting point... Because if they understand what's happening with that patient, who is ventilated, then it... it might just bring everything together... (Nursing participant – Hospital Management)*

Participants felt that ICU nurses had a poor understanding of antimicrobial agents and had a general lack of knowledge regarding the correct administration of the medication and that poor clinical practice may contribute to bacterial resistance.

*...they should have the knowledge of antibiotics and the reasons why... and their pros and cons. I think it's important because ICU is not a place you need to have limited information. You need to know vast... (Nursing participant)*

*Doing it correctly... is making sure that what I'm getting is the original antibiotic... because that has happened before. And obviously each drug has its own mixing... You play an important role.... if something has to be mixed with saline and it gets dex water, you know, it's stuffed. You know, it's not going to work... (Non-nursing participant – Hospital Management)*

*... I don't know why people give it as the whole individual line. But they do... a lot. I often find that with... especially the ICU patients that I'm looking after... then I'll come and there will be an IV medication line... When actually there's a fluid, and you can just piggyback... like... piggyback your little antibiotic on your add-a-line and it's done the job in the same amount of time and you can even actually fill... refill your line with some of the fluid from your maintenance and rerun it so that... ja... (Nursing participant)*

*Some nurses don't give a space apart between... giving medication... for instance... you give your Ciprobay at 10 o'clock and then 10:15 you're giving another antibiotic... (Nursing participant)*

*I mean, no one takes a second to stop and really assess antibiotics as a... as a whole... I only ever looked in the Mims and that's as far as I got. (Nursing participant)*

#### 4.3.3.2 POOR STAFF ATTITUDE

Barriers to the effective development of the ICU nurse in antimicrobial stewardship and to the care of the critically ill patient that were identified by participants included poor attitude and disinterest in nursing. Nursing participants felt that some ICU nurses showed poor compliance with universal infection control measures. Both nursing and non-nursing participants felt that some ICU nurses showed poor attention to detail. Several non-nursing participants perceived the personality of the ICU nurse as important with regard to the way that they practiced nursing. A non-nursing participant felt that it was difficult to choose the right staff to work in the intensive care unit.

*...you would get some nurses who would be basically... would only give you what is asked of them. You understand what I'm saying. So... there's a difference, there's one of a passive role and one of a proactive role. So, that's... that's the difference. The ICU nurse should be one of a proactive... she should be proactive... (Non-nursing participant)*

*Well, I suppose it has all got to do with attitude. I don't know... you get a nurse like [ ], for example... You get people like [ ], that will basically go and do as much as they... as he or she can for the patient and you get the next nurse who will do the bare minimum... I suppose it comes down to the attitude even... if they... If they are just there because it's their job... (Non-nursing participant)*

*...confidence... that's all-round confidence and that's what I'm saying... some of them do ... and some of them don't. And it's not a racial thing either. I mean, somebody like [ICU nurse] will phone me up and say 'Doctor... why did you do XYZ'... and the next one won't... that's why I come back to attitude... it's all about the nurses confidence and attitude. Does she want to learn and better herself... or doesn't she ... Am I here to collect my salary or am I here to do my job? (Non-nursing participant – Hospital Management)*

*... I think needing more buy-in and commitment from the nursing staff... with regards... to an example... would be the taking of the specimens when required. Often when I ask... 'This catheter was put in on this day... where is that result. Has that urine specimen been sent off?' Then it is a matter of... 'I don't know'... or... 'I wasn't on duty' ... or 'we can't find the results'... and so forth. So having that commitment that... we will do it... It's a must... it's not negotiable... We have to do it come what may, you know. (Nursing participant – Hospital Management)*

Nursing participants expressed concern with ICU nurses' noncompliance with practice fundamental to infection control in an ICU. Poor hand washing and non-compliance with VAP bundles were identified as problem areas.

*I think like when you first come to work... I think... I don't see many people washing hands... (Nursing participant)*

*I think sometimes people are a bit slack hey... they don't always wash their hands. They should come back from lunch and wash their hands, go to another patient and wash their hands. Well I don't think their... You know that it has got to be watched. (Nursing participant)*

*Well, I think it is up to yourself. There's not... No one watches someone else wash hands... To me it is really... really important... washing hands. It is... it is up to your conscience, you know, because you have been told... We've all done hand washing... (Nursing participant)*

*The bundles and as well as everything else.... the bundles are one part of it, you know. But it's hard for me to just explain, but I'm not with the nurse 24 hours of the day. I can't see that you are dropping that patient below 30°, so when I... go back to the point of being committed, we need to know that when we are not around that it is not happening. But I don't know if it's ... if I can actually honestly say that I trust in the staff, that they are doing what they are supposed to be. (Nursing participant – Hospital Management)*

Participants expressed frustration with the apparent lack of personal skills of ICU nurses; these were identified as the lack of initiative, poor organisational ability in documentation and filing and attention to detail.

*... the nurse's responsibility... At this stage, I mean, we are all adults and you shouldn't... especially in an ICU, you... you shouldn't wait for somebody else to come behind you and tell you... You know every day that you should be doing it! (Nursing participant – Hospital Management)*

*I don't know if it is confusion... but, generally... generally... I think that there is no... There is just a lack of... What's the word I'm looking for...? A lack of organisational skills... I think the information is there... they receive the information... but they are... It's just lack of organisational skills and haphazardness... in filing of that and... And making sure that the document is filled in completely. (Nursing participant – Hospital Management)*

*I think that there is the case for ongoing teaching and learning... but you've... You're talking about somebody who has been in the profession for 15 years now... who has gone through basic training, gone... Who's gone through ICU training... who has gone through, you know, a [ ] of a lot and if you still don't have that, you know, that attention to detail and commitment, then it's a bit far gone! (Nursing participant – Hospital Management)*

Nursing and non-nursing participants mentioned missed positive laboratory results.

*You send off the specimen... You know it's pointless if you are not going to look at the results. (Non-nursing participant – Hospital Management)*

*I say with my patients... I don't care what the other okes do, but in my patients I want to sign that thing... If I haven't signed it, you're not allowed to file it. I mean... you put them under my nose and say 'Doctor [ ], have you seen this'... 'Oh yes, I have. thank you very much'. Fine... so I know that it's there. (Non-nursing participant – Hospital Management)*

*... basically to beg them to get the information... 'Is anything back?'... 'Well I don't know...' And this and that... And you have to go and dig through the whole file to see if there's anything new... (Non-nursing participant)*

*And it is often not even filed in the correct order. You know... the actual laboratory results... that you could get yesterday's one... way down the line... You know, it's not in... in date order. (Nursing participant – Hospital Management)*

*... we get your blood results but nobody looks through them. Because you get prelim after prelim after prelim and then you get a final and... And everyone just says oh... there are lots and lots of blood results... just punch them and put them in the file. So it doesn't... doesn't always get looked at and then... some days down the line... you'll look and doctor will ask... 'Has anything been cultured on this?'... And only when you go and look there and you find... 'Oh... this, this and that has been cultured'... but no one has said anything about it... or... maybe I'm not saying it... maybe no-one noticed it. (Nursing participant)*

Nursing participants suggested that nurses did not have knowledge about antibiotics and antimicrobial stewardship. One nursing participant said that junior nurses especially just did their job. Another nursing participant said that nurses would feel more confident if someone taught them.

*I think each and every ICU nurse needs to know about what antibiotics are. They should not just... And just give because it has been prescribed... I don't think they do have... I don't think they do have knowledge about them. Most nurses... not all of them... not all of them. Obviously junior nurses... They are just doing their job. (Nursing participant)*

*I would feel confident if I know, you know, I had someone who's taught me about this and I have it in black-and-white. (Nursing participant)*

*The rounds are actually about patient's diagnosis. Why, okay, he's got these antibiotics. Unfortunately I'm not in the state where I can question the doctor about them. (Nursing participant)*

Both nursing and non-nursing participants said that the personality of the ICU nurse determined the role that the nurse would play in antimicrobial stewardship.

*So it depends very much on the person's personality and that's my view of nurses. That I'd rather have someone that wants to... and is eager... and obviously you need to have a bit of... a bit of something up here. The question is really the desire to want to... Once you have got the desire to want to we can do lots with you. (Non-nursing participant – Hospital Management)*

*I think that the personality of the individuals is going to determine exactly what role... Some... some ladies in the nursing profession are just a bit more forthcoming than others. (Non-nursing participant)*

*I have to get used to the personalities... you know. I am... when I work with people... That is why I kind of prefer to work with the same team all the time, you get a feel for what are the limitations of the different people. (Non-nursing participant)*

A non-nursing participant felt it was very difficult to interview for suitable ICU nursing staff with the correct personal attributes.

*It's impossible. In an hour interview, how do you, how do you decide how somebody is? (Non-nursing participant – Hospital Management)*

*It's all about... and I can see them in ICU... I can see those that are there, and want to be there, and want to do the best for the patients... and I can see those who... and we have*



*got lots of those... (Non-nursing participant – Hospital Management)*

*I think... personally, I think, in an ICU situation, which is a highly specialised unit... that the first most important point is to get the right person in. And I understand, and I have been part of, and I know that there is a shortage of nursing staff in the... Countrywide... worldwide... it is a shortage. But, you know, you're left in such a tight spot or a difficult situation when you just employ a body. And especially in a highly specialised unit, like ICU. So yes, you can teach an old dog new tricks, or mentor and train people but getting that skill is of utmost importance, from the very go... (Nursing participant – Hospital Management)*

#### 4.3.3.4 COLLABORATION BARRIERS

Both nursing and non-nursing participants identified collaboration barriers to the development of the nurse's role in antimicrobial stewardship and felt teamwork was generally poor within the stewardship programme. Nursing participants felt that the doctors' attitude was dismissive at times. Nursing and non-nursing participants recognised the need for nurse diplomacy in interactions with doctors. Participants were concerned about the lack of experienced nurses working in the unit with particular reference to the lack of the ICU trained nurse. Non-nursing participants referred to the use of enrolled nurses within the ICU and the effect that this had on doctor expectations and interactions. Non-nursing participants were concerned by the passive behaviour of some ICU nurses with one referring to some ICU nurses playing a 'mechanical' role. Several non-nursing participants showed frustration by their particular choice of language when discussing various aspects of nursing practice by using words such as 'switch on', 'a 2 year old's question' and 'think, just think!'. Nursing participants said that they were not part of the decision-making process and extended this to general patient care in the unit. A non-nursing participant said that it was the responsibility of the ICU nurse to actively take part in the decision-making process but acknowledged that some doctors may not listen to the nurse.

*... there are the odd doctors who might say... what do you think... or how do you feel about this or what could... what else can we do... but not very often... No, not often at all... (Nursing participant)*

*Like a doctor, if asked... just asked... that 'maybe you should considering putting the patient on this antifungal as... as opposed to that antifungal', and he would say 'no, just leave it such' and the next day he will come and then change it to your suggestion... (Nursing participant – Hospital Management)*

*...we don't understand sometimes why he would prescribe a certain thing and we like... it*

*would be nice to understand why. (Nursing participant)*

*I think it's part of the responsibility of the nurses' role to... You are a ICU specialist as well and if you've done the job for years and years and years and you have... I suppose... a good idea of what's going on. And if someone like [ICU nurse] advises me and says... 'This patient has been on the same antibiotic for so long... look at this and look at that' and I will listen to you. Unfortunately some people won't. (Non-nursing participant)*  
*I was asked... 'Do you think that this patient is ready for extubation'... And... my gut is just like... I don't know if we're quite there yet... and then he made his own decision anyway. So [laughing] ... exactly... what do you do... oh ja. (Nursing participant)*

Nursing participants said that ICU nurses may find it difficult to discuss treatment because of the perceived dismissive attitude of some doctors. A nursing participant felt that ICU nurses were not regarded well by medical colleagues. Another nursing participant said that collaboration was dependent on the personality of that doctor. A nursing participant suggested that ICU nurses may be afraid to discuss treatment choices with the doctors because of doctor attitudes.

*I think alter the doctor's awareness of explaining what he needs to do and how he needs to tell the nurse to how to treat a patient on this specific antibiotic. Because sometimes we would say... 'Why does this patient need this antibiotic... when he should be on this... because it does this, this, this, and this'... And the doctor... 'No. you just give it!' Maybe they think that they are being undermined by being asked why they are giving this. (Nursing participant)*

*You know the doctors think I am just a nurse... just sometimes to carry out orders... (Nursing participant)*

*It's... you know it's... such a difficult one because it is also... largely personality dependent. The doctors, you know... because it's their attitude as well. They see it as... you know the attitude... 'You know I'm the doctor.... and if I say it's got to be done... it's got to be done.' (Nursing participant)*

*I think that sometimes the nurses are afraid to challenge the doctors... because the doctors believe that they know all... and they will do as they please. (Nursing participant – Hospital Management)*

The fact that doctors were often very busy and the impact that this made on effective communication was noted by several nursing participants. Nursing participants found that this made discussion of treatment with the doctor generally difficult.

*...sometimes when you do talk to the doctors... some of them... he says ja, ja, ja, no, okay, okay... and you're busy telling them the rest of the stuff, and they go ja... ja... and carry*

*on, on the phone... or out the door. Or, if you're on the phone talking to them, 'Hi Doctor, I've got this, this and that, or Mrs So-and-So has got this problem and whatever'... and then... before you can even say the next thing... they put the phone down! You know... that's the most frustrating thing and then you try to phone them again... or... you know... you don't get a hold of them... or they cut the call because they are probably busy... and I know they're busy... but you know what... I don't have all the time to be sitting on the phone the whole day...! (Nursing participant)*

Nursing and non-nursing participants identified the potential for conflict with doctors when discussing antimicrobial management and the role of diplomacy that ICU nurses had to play. A nursing participant expressed the importance of advocacy but was concerned about overstepping perceived inter professional boundaries.

*...maybe the user does not like listening to the nurse... and it's an ego thing as well... doctors don't like being told they're wrong... they don't. It's the way you approach them and discuss with them... (Non-nursing participant – Hospital Management)*

*I think also your approach and manner. Not coming across as I know it all... You are doing the wrong thing and this is what you should be doing or whatever. But rather having a discussion and say that... 'I've established that this patient is on this antibiotic, but that maybe we should try this because the patient is sensitive.' (Nursing participant – Hospital Management)*

*So obviously not telling the doctors what to do but just sort of make sure that we are doing the right thing, especially in the ICU. (Nursing participant – Hospital Management)*

Most participants expressed concern that ICU nurses employed to work with the patients in the intensive care unit appeared to lack experience in ICU nursing and often did not have the necessary skills. A non-nursing participant said that this impacted on doctor expectations of nursing staff.

*I suppose nurses have different levels of clinical experience and knowledge. You know, a very well trained ICU sister, would be able to interpret, you know, clinical data... blood results... blood gas results, blood pressure trends... you know... all sorts of things... and draw conclusions from that. (Non-nursing participant – Hospital Management)*

*I think that there is a difference between the ICU trained person as compared to the ICU experienced person... I think that they have more insight into... into the full clinical picture of the patient and not just looking at, you know, a piece of paper... Ja. (Nursing participant – Hospital Management)*

*... you get the complete experienced ICU nurse that the doctor has known for years and trusts their judgement and they... they know that they know what they are doing. And the doctor will trust their judgement and listen... And I know a few who know what they are doing... they are confident... and they know what they are doing... (Non-nursing participant – Hospital Management)*

Non-nursing participants felt that effective communication was affected by nursing levels of training and experience and related this to working with an enrolled nurse

*I suppose you communicate on a different level with a less trained nurse. (Non-nursing participant)*

*That is why I kind of prefer to work with the same team all the time. You get a feel for what are the limitations of the different people. And that's why I make an effort to know everyone by name because I make associations. (Non-nursing participant)*

*...maybe it could be something to address... that you as a clinician could understand that if I'm talking to a staff nurse versus an experienced... a five year experienced, ICU sister. (Non-nursing participant – Hospital Management)*

*Can't just assume an enrolled nurse will know what an MC&S is... These days, if you are a nurse... I don't know what the bare minimum requirements are... but they often don't even know how to do a blood pressure. How are they going to know about an MC&S and bugs and antibiotics and stuff? I mean... It's ridiculous... if it is a patient in the ICU... (Non-nursing participant)*

Some non-nursing participants said that they were unable to identify trained nurses in ICU.

*I think it's important that ICU trained staff should be identified... when you walk into the unit. Then you know that, that person has ICU training and then you can immediately... you know your expectation is elevated. (Non-nursing participant – Hospital Management)*

Some nursing and non-nursing participants appeared frustrated when they discussed how they perceived the way that ICU nurses conduct themselves as professionals.

*You're talking about somebody who has been in the profession for 15 years now... who has gone through basic training, gone... Who's gone through ICU training... who has gone through, you know, a [ ] of a lot and if you still don't have that, you know, that attention to detail and commitment, then it's a bit far gone! (Nursing participant – Hospital Management)*

*Move from the Florence Nightingale era... I think that what we should be telling our nurses is that they should think for themselves...*

*... It's about thinking... Not only antibiotic stewardship... it goes for everything in ICU really. Why..? I think the biggest question we should ask ourselves is why...? A two year olds' question... Why...? (Non-nursing participant – Hospital Management)*  
*And that's why I make an effort to know everyone by name because I make associations. So I might not know the... their... their specific rank... but I've got a very good previous experience of this one I can leave to interfere with the ventilator... and this one rather not... And so on... (Non-nursing participant)*

*And you know they spend most of the time with the patient so they are monitoring, you know, they are recording it. So just to switch on a bit, you know... not to just record... to be proactive... to be in the moment... So recording it but just switch on... Is the patient improving, is the patient deteriorating, you know, I feel they are the best facilitators for the patient. (Non-nursing participant)*

*It would mean a more multidisciplinary approach to treatment of patients, especially in the ICU. These patients may have complex conditions... and input from other... well, sort of... health professionals would be, sort of, beneficial to the patient as a whole. (Non-nursing participant)*

*I think, sometimes there are nurses who are good enough to basically bring to my attention that this is a problem and this is obviously a side effect... and this is obviously, you know... an issue with drug administration which can cause a problem. Or, you know... There are also individuals, unfortunately, who have more of a mechanical role. (Non-nursing participant)*

*If I (the nurse) file this thing, I (the doctor) am only going to see it tomorrow morning... Think...think... ICU is about... think... (Non-nursing participant – Hospital Management)*

#### 4.3.3.5 WORKING IN ISOLATION

Participants identified feelings of isolation as barriers to the development of the nurse's role in antimicrobial stewardship. Both nursing and non-nursing participants felt that they did not know about some of the stewardship activities. Nursing participants said that there wasn't feedback about the programme. Nursing participants stated that they felt that there was inadequate support of the antimicrobial stewardship by doctors and pharmacists and that neither of these groups attended the weekly teleconference. Nursing participants felt that the pharmacist was important to provide support to both the antimicrobial stewardship initiative generally and specifically to ICU nurses who needed help with the preparation and administration of antimicrobial therapy. Non-nursing participants said that they did not need

the help of the pharmacist in the decision-making process with regard to antimicrobial therapy. A non-nursing participant identified the doctor as the person who should be leading antimicrobial stewardship.

*... when I think of a team, it should be all of us. But at the moment it's just me and [infection control sister], the pathologists and the lab sisters. (Nursing participant – Hospital Management)*

*Well, the nurse looking after the patient is critical, the infection control sister is critical. The doctor, one cannot do without... You know, the... the doctor should be the champion in the team... should be leading the team of antibiotic stewardship. Then the clinical microbiologist... we don't have really an epidemiologist... but that would be an important role. It would be very important. We don't have that as well. Now the clinician... But, we need to coax the clinician to make him the responsible person in the antibiotic stewardship team because he knows most about the patient than anybody else. (Non-nursing participant)*

A non-nursing participant pointed out that without adequate communication healthcare workers were working in isolation.

*You see, there is no feedback on that to us as clinicians... which is crazy. You know, it's all very well having these meetings but, I think, it is always good to get feedback to your clinicians, you know. Find out what bacteria are being cultured... what they are resistant to... what trends that are happening in bacteria. Is it one bacteria that's coming up the whole time... I think it's important that we know about these things because otherwise we are all working in isolation. (Non-nursing participant – Hospital Management)*

Nursing participants were concerned that there wasn't feedback about the antimicrobial stewardship programme to the shift leaders, and that ICU nurses did not meet to discuss developments in the unit.

*... there's not much feedback... not that I'm aware of... that I've ever had back... and I have been involved in doing those rounds but... I haven't had any feedback. (Nursing participant)*

*Ja, I actually think that we don't have enough meetings as, you know, we always... I always ask [unit manager] for meetings. But we don't have enough... as nurses to communicate what is going on in the unit, even besides the stewardship, what else is going on in the unit? I mean, when did we last have a meeting? Hey? I don't even know. We should have a meeting at least once a week... (Nursing participant)*

Nursing participants said that there were difficulties in getting support from doctors for the antimicrobial stewardship initiative. A nursing participant referred to the lack of support of doctors at the weekly antimicrobial stewardship meeting. A non-nursing participant felt that it is difficult for doctors to attend meetings.

*We tried initially to get the doctors on board to actually form part of our team and to join our meetings but they sort of... I think Dr [ ] was there once. They don't seem to be very interested... (Nursing participant – Hospital Management)*

*We did invite the doctors as well. I think they might have attended a couple, but it is not always possible. It is at 10:30 on a Friday morning... so... I don't know... Maybe the times are not the best for the doctors, because can you imagine at 10.30, it is quite a busy time for them as well. Ja. (Nursing participant – Hospital Management)*

*... I think that they tried to start something like that, in the last year or so. Especially with the microbiologist... they attempted to do that... But I think that the major challenge is getting doctors on board at the right time. We've had a couple of... sort of... meetings with the microbiologists. If I'm not mistaken, I think about two, I attended with my patients... But the problem is that not all [doctors] attend, number one and... And number two, I can't blame them, also, because sometimes the schedule is not convenient... you know what I mean... (Non-nursing participant)*

Nursing participants suggested that there was sometimes resistance from doctors when trying to promote infection prevention and control measures. A non-nursing participant disagreed with some of the hospital's infection prevention and control policies.

*I think that maybe they either don't really know that... what we are doing... or what our role is. Maybe they don't understand our role. (Nursing participant – Hospital Management)*

*Some of them will not put a cap on and they will not put a gown on. They will not do this and they will not do that... (Nursing participant – Hospital Management)*

*I think that the doctors are the problem I think... to a great extent. I'm not saying that... only them... but there is some resistance there. (Nursing participant – Hospital Management)*

*... we have an infection control sister here, who in my view, who... not always... but sometimes has the cat by the tail. And do... I don't know... At some stage they were doing groin swabs and this swab and that swab... and I think it is totally inappropriate, because now you're getting MRSA or E.Coli from the groin. What clinical relevance has that got... If my patient is not infected or not sick... or not got... what clinical relevance? I*

*don't think it has got any clinical relevance. You won't find a MRSA but you find a 'staph' in their groin... so now...? (Non-nursing participant – Hospital Management)*

A non-nursing participant identified poor communication with regards to infection prevention and control developments in the hospital.

*I don't think it's the ideal situation but I have never had any personal meetings or dealings with her. In fact, I don't even know who the infection control sister is... and that's a poor reflection on me... and it's a poor reflection on the hospital. (Non-nursing participant – Hospital Management)*

Nursing participants were concerned that the pharmacist was not part of the antimicrobial stewardship programme. They felt that they did not get the support that they needed from the pharmacist.

*... I would like to make it a success. At the moment I feel that we're not succeeding 100% and that is because we're lacking in certain areas. Like, for example the pharmacy input... the pharmacists' input... (Nursing participant – Hospital Management)*

*...initially we had a pharmacist that was very keen and was very involved but left and the pharmacist that that we've got now hasn't been part of it at all. (Nursing participant – Hospital Management)*

*We have tried numerous time to get the pharmacists involved by sending them e-mails and reminding [ ] in every unit manager meeting... when [ ] is there we tell [ ]... please join us... we do it. [ ] been once and [infection control sister] has actually gone as far as to ask [hospital manager] to speak to [ ]... but still nothing, absolutely nothing. (Nursing participant – Hospital Management)*

Nursing participants identified the pharmacists as being important in supplying information to the ICU nursing staff but that this is not happening. A non-nursing pharmacist referred to the importance of giving medication correctly.

*... you know, you don't actually get the advice that you should because we don't always know what antibiotic overlaps... which antibiotic overlaps. Although, we try as much as possible to read and to check and double check. But that, I think... that's where the pharmacist is very important because they should be able to tell us... 'look what this antibiotic... you shouldn't be giving these two because they overlap'. Or, you know, suggest something else. But we have got no input from that so we just try our best from our side to make it work. (Nursing participant – Hospital Management)*

*... but their role is to understand... That, I'm giving Meronem... What... and how is it*



*reconstituted, how it is given... (Non-nursing participant – Hospital Management)*

Non-nursing participants felt that the pharmacist did not need to play an active role in antimicrobial stewardship in this hospital and that the pharmacist was not part of the doctors' decision-making process with regard to antimicrobial therapy.

*I very rarely use the pharmacist... you know, the pharmacist role is often really... it's almost a check and balance situation, about checking my dosage is correct or possibly checking an allergy that I hadn't been aware of... penicillin allergy or cross sensitivity to penicillin... 'The patient has got an allergy to this... do you want to use it?' So the pharmacist role is very much in that capacity, not so much in the decision-making capacity. (Non-nursing participant – Hospital Management)*

*... they do have to be on-board, but maybe not to police but to make sure that the right antibiotic is available at the right time. (Non-nursing participant)*

*A pharmacist can inform us when somebody is on, say, Meronem for 24 days. So they can provide us with background information. (Non-nursing participant)*

*Ja, the only thing I think the pharmacist needs to know in the ICU... we have got to have originals. Done. They have no clinical background in terms of what does this antibiotic... or what the Augmentin spectrum is... they may or may not. I'm not sure if they do... they may or may not. But I can talk to my microbiologist and he's got... secondary to that, he has thirty years of clinical experience on ICU patients... directly and... Quite honestly the pharmacist adds no value... (Non-nursing participant – Hospital Management)*

*I quite honestly don't think that the pharmacist adds any value... and then also [ ] the psychologist, and the physiotherapist... So those are part of my team, but they are definitely not people that I would go and ask if I... if they think I have an appropriate antibiotic on board? The pharmacist may know... The only thing I do get angry about... but they know about it now.... is generics. Where... it may be the only role that they can play... (Non-nursing participant – Hospital Management)*

Non-nursing participants suggested that some doctors might perceive that their practice is being criticised and feel that their autonomy is at risk. A non-nursing participant expressed the importance of how such an initiative is implemented.

*Well, as far as stewardship is concerned... all I can say is... it has potential for making an ICU better... but unfortunately... one can also meet with antagonism. Simply because people feel threatened about their skill and liberty and they don't like any criticism. And so... if one implements it wisely... I think there is huge potential. I personally don't have that kind of issue, but there are clinicians that don't like it... or they don't like being told.*

*(Non-nursing participant)*

*... the European structure and the United States structure in terms of how they manage the health care system... like the NHS... It is a different structure here... There the doctors work for the hospital. Here the doctors are private... (Non-nursing participant)*

*I would think in the private sector... in the South African private sector... it would be difficult... because the doctors don't like being told. (Non-nursing participant – Hospital Management)*

*... the problem is still the doctor and physician buy-in culture in South Africa. (Non-nursing participant – Hospital Management)*

#### 4.3.3.6 ECONOMIC BARRIERS

Participants identified economic barriers to the development of the nurse's role in antimicrobial stewardship. These were barriers which might have been due to issues within the private healthcare sector in South Africa, issues relating to the financial pressures that might occur with the development of a new hospital and issues that might have been due to medical aid organisations need to control healthcare costs. Non-nursing participants said that the intensive care unit should be managed by one doctor to co-ordinate general decision-making in the unit. Nursing participants were concerned that in-service training was not happening in the unit. A non-nursing participant felt that it was the responsibility of the hospital to provide training for nurses working in the hospital. Non-nursing participants were concerned about the use of unqualified nurses to look after critically ill patients. A nursing participant suggested that hospital-acquired infections had a reputational cost for the hospital. A non-nursing participant said that it was difficult for the pharmacists to provide support to the antimicrobial stewardship initiative because of staffing constraints. Non-nursing participants were concerned that medical aid companies placed pressure upon doctors to keep costs down by using generic antimicrobial drugs.

*A single intensivist or anaesthetist... is like, sort of, globally informed about all the patients... there is one person to go to. You understand what I'm saying? So there is one person to talk to about these things, you have some sort of standardisation. (Non-nursing participant)*

*I think an ICU person has... Somebody's got to be the coordinator, to put the appropriate people in place, and the appropriate systems in place and then things will work... Simple! (Non-nursing participant – Hospital Management)*

Participants identified certain factors that contributed to difficult working conditions which impacted on patient care and opportunities for learning. One nursing participant said nursing was based on shift work and that it was not possible to get ICU nurses to come into the hospital on their days off duty for training. In-service training was also seen as difficult in the ICU with distractions and unstable patients

*I know there is always a lack of time, or a lack of... You know when you want to do something but it is usually with the people on the shift... You know to get people from their homes to come in for an hour. It doesn't happen... (Nursing participant – Hospital Management)*

*...you try and do it while everybody is on duty and then the phone is ringing and doctors are coming and the patient's unstable so it is difficult to get them all together. (Nursing participant – Hospital Management)*

*...because, I mean, we are always busy. So it is a matter of making a sort of a timetable that maybe once a month we are doing blood result training... how to read a blood result, how to identify an abnormality from a blood result. (Nursing participant)*

A non- nursing participant suggested that training of nurses is a responsibility of the hospital.

*...teaching and training has to become part and parcel of the hospital's... private sector's responsibility. The idea that the private sector can just go and poach nurses from the public sector... Those days are gone... we have got to train our own nurses... train them up in the culture of the hospital... train them up to the standards that we would like and expect. (Non-nursing participant – Hospital Management)*

*I mean... Sometimes, there is even a staff nurse looking after your patient. I mean... you can't expect a staff nurse to know anything... They are just there just really to make sure, you know, that the wheels don't come off completely, you know. Other than that, they are not adding anything really of value... but that is the reality of it. You know, we have got a critical shortage of trained staff... Often we don't know who's trained and who isn't. So your expectations influences your... your lack of expectations...It influences your interaction with the nurses. (Non-nursing participant – Hospital Management)*

Participants said that increased cost to patients, families and health care systems was seen to be a consequence of poor antimicrobial management and poor infection control which could result in increased hospital-acquired infections.

*The cost of an infection would mean a longer stay for the patient in hospital, so cost in terms of nursing hours, nursing salary, cost in terms of... If the patient needs to go back*

*to theatre, costs involved in theatre time, surgeons' time and so forth. Pain and suffering for the patient, pain and suffering for the family. Loss of work for the patient, if it is a person who is working... Reputation, which I think is the biggest one to the hospital... where it dampens... dampens the image... The reputational image of the hospital which in the bigger scheme of things, I think is actually the worst cost... or biggest cost. (Nursing participant – Hospital Management)*

Lack of pharmacist support was identified by nursing participants as impacting on antimicrobial stewardship. A representative of the pharmacy department was concerned that due to inadequate staffing in this department they were not able to spare a pharmacist to participate actively in antimicrobial stewardship meetings.

*... the pharmacist is not actively involved in the programme. I have been told that it is not happening... because the pharmacy is too busy and we don't have enough pharmacists... (Nursing participant – Hospital Management)*

*I haven't been involved too much in antibiotic stewardship here and I should be. I should be. We... I have had challenges here and I still have challenges in terms of mainly dispensing and having enough pharmacists to do normal daily dispensing. (Non-nursing participant – Hospital Management)*

*I don't think I could handle the clinical function as well... I would love... to get involved with it because it's what we studied. The clinical pharmacist... I would employ a pharmacist dedicated to do that function... Financially, we can't support that role... (Non-nursing participant – Hospital Management)*

A non-nursing participant said that the policy in this unit is to use original antimicrobials. The use of generic antimicrobial therapy in the ICU setting was generally seen to be problematic and was opposed by nursing and non-nursing participants.

*...that is ICU policy... we don't use generics. Simple! (Non-nursing participant- Hospital Management)*

*...we had a problem with intravenous [original] versus [generic]... As you know about that case, the patient did really badly and we still thought it was truly original [ ]... there would have been a chance. (Non-nursing participant)*

*It's because of the abuse of antibiotics, because of the generics that, you know, are being abused and because of the inappropriate choices of antibiotics. We are seeing increasing trends of resistance of organisms... so ESLB rates are increasing... our Carbapenem lactamase resistance bacteria are coming in... You know, are coming to KZN as well. And apart from that, we're seeing an increasing trend of Candida infection*

*and even amongst the Candida... the resistance is increasing. And this is all because of the inappropriate choices, the inappropriate duration... the inappropriate combinations of antibiotics that's also tending towards the increase of resistance. (Non-nursing participant)*

Non-nursing participants referred to pressure from medical aid companies to reduce the costs of caring for patients in ICU by using cheaper antimicrobials.

*The medical aids, although they paying... are always onto the hospital about costs. So there is pressure... although they are paying, there is pressure. They are saying, you know what... your hospital spends 10 cents on every patient for... and the industry average is 8 cents... why? (Non-nursing participant – Hospital Management)*

*...there's also financial factors that come into play and there's a drive from the medical aids to go as cheap as you can. But as you know when you are in ICU, that's the one place you don't want to do that. (Non-nursing participant)*

*They don't look at outcome... they don't look at all the other things that don't happen and say. Well, you know what, you have got no infections, you have got no superbugs you have got no this and that... and therefore in the long term... the patient outcome... The stats, because if you look far into the future the picture looks quite fine... They don't care... remember medical aids... are not about helping the patient. They are about making money for themselves... and that's the truth. (Non-nursing participant – Hospital Management)*

One non-nursing participant supported the use of generic antimicrobial therapy.

*...native drugs are not the same product as ... how shall I put it... Augmentin that was registered 10 to 15 years ago, and registered as that... It is not the same Augmentin anymore. So how do you differentiate what is a generic and what is not? So, if you look at generic substitution, of course you look at quality. If you look at a company like Sandoz... it is a Novartis based company with high standards, so it is a company you would use. The smaller companies that are not that well-known, maybe you would be a bit sceptical about. (Non-nursing participant – Hospital Management)*

#### 4.5 SUMMARY OF CHAPTER

This chapter describes the contributions of the fifteen multidisciplinary healthcare professionals who participated in this study. Analysis of the interview data into categories and sub categories is shown. Participant perceptions with regard to the role that the ICU nurse plays within antimicrobial stewardship are presented. Suggestions were made by the participants as to how this role can be developed and these have been included along with factors that could affect the development of this role.

## **CHAPTER FIVE: DISCUSSION OF FINDINGS**

### **5.1 INTRODUCTION**

This chapter discusses the responses of the participants according to the objectives of the study and considers current literature on these issues in the context of the underpinning theory of symbolic interactionism.

### **5.2 DISCUSSION OF FINDINGS**

In the previous chapter participant responses were presented in three main categories. These responses will be discussed in this chapter in these same categories:

- i. the nurse's role in the antimicrobial stewardship team in this ICU
- ii. development of the nurse's role in the antimicrobial stewardship team in this ICU
- iii. perceived barriers to developing the nurse's role in the antimicrobial stewardship team in this ICU

#### **5.2.1 THE "MASSIVE RESPONSIBILITY" OF THE ROLE OF THE ICU NURSE**

The interviews with the fifteen participants from the six healthcare disciplinary backgrounds outlined a nursing-initiated antimicrobial stewardship programme which was well supported by microbiologists. Participants expressed awareness of increasing bacterial resistance and the decreasing effectiveness of antibiotics and the reasons why antimicrobial stewardship has become a responsible healthcare intervention in critical care (Rice, 2003; Alanis, 2005; du Toit, 2012; Fry 2012). The ICU nurse was identified by all participants as essential to the successful functioning of antimicrobial stewardship. The role of the ICU nurse in the antimicrobial stewardship team was seen as; organisational in setting up the antimicrobial stewardship programme, documenting patient data and surveillance; advocacy in promoting optimal patient care within the antimicrobial stewardship programme; clinical in monitoring patient parameters and infective markers, the management of antimicrobial therapy and the prevention of hospital-acquired infections and finally; collaborative in communicating clinical changes and laboratory results with other members of team. Some of the essential elements of critical care nursing are; clinical judgment, clinical inquiry, collaboration and advocacy (Moleki, 2008).

### 5.2.1.1 ORGANISATIONAL ROLE

The organisational role of the ICU nurse in the antimicrobial stewardship team was seen by participants as daily documentation of relevant patient data for unit records and laboratory surveillance data. Nursing participants explained that the antimicrobial stewardship programme in this private intensive care unit was initiated by nursing management with the support of a private microbiology laboratory soon after the hospital opened. This was in response to a growing awareness for the need to manage the ICU environment optimally and provide safe care for patients. Only two participants, a nursing and a non-nursing participant, had previously been part of an antimicrobial stewardship programme. All the nursing participants felt that it was an important initiative although this type of intervention was new to them.

Small community hospitals were identified in the 2011 report of the Infectious Diseases Society of America (IDSA) as having higher rates of antimicrobial use than large academic medical centres and were less likely to have antimicrobial stewardship programmes (Storey, Patel, Nguyen and Chang, 2012). ICUs are the areas with the highest use of antibiotics in a hospital and are also the epicentre of antimicrobial resistance (Kaki, Elligsen, Walker *et al.* 2011). The early detection of pathogens, appropriate use of antibiotics and reduction of hospital-acquired infections are essential in the care of the critically ill patient (Afshari, Pagani and Harbarth, 2012) and all ICUs should have antimicrobial stewardship programmes with the aim of ensuring that infections are treated promptly with effective regimens (Kollef and Micek, 2012).

Morbidity and mortality is increased by infections caused by resistant microorganisms (World Health Organisation, 2013). The aim of antimicrobial stewardship is to minimize bacterial resistance by implementing effective infection control practices and monitoring infections, infective markers, invasive lines and antimicrobial use. It is being promoted as the fifth pillar, or bundle, of the '*Best Care, Always*' campaign in South Africa (Best Care Always, 2012). There has been a drive within the private healthcare sector in South Africa to implement the '*Best Care, Always*' bundles with 192 private hospitals joining the movement to reduce infection rates (Kantor, 2011; Kantor, 2014). A bundle is a collection of evidence-based interventions to improve care and is especially effective when all bundles are applied together (Best Care Always, 2011). The first four infection bundles of the '*Best Care, Always*' campaign are the prevention of central line infections (CLABSI), the prevention of

ventilator-associated pneumonia (VAP), the prevention of surgical site infection (SSI) and the prevention of catheter-associated urinary tract infections (CAUTI) (Cleghorn, 2011).

Nursing participants reported that documentation of laboratory results, line days and duration of antimicrobial therapy was routinely carried out by the floor nurse allocated to care for that patient during a twelve hour shift. Nursing participants viewed the monitoring of 'line days' as an important daily task and invasive lines were removed when no longer indicated. The need for daily review of invasive indwelling intravascular catheters reduces the risk of catheter-associated bloodstream infections (Mendelson, Whitelaw, Nicol *et al.* 2012). Nursing participants viewed daily shift leader rounds to be another organisational aspect of the intensive care nurse's role within the antimicrobial stewardship programme. These were carried out each morning to monitor ensure bundle compliance, nurse documentation of antibiotic treatment, positive laboratory results and any changes in doctors' orders.

Documentation from the shift leaders' rounds was also used for the collection of data by the hospital's infection prevention and control nurse for long term analysis of nursing care and resistance profiles in the unit (Vasuthevan, 2012). Collection of this type of data allows an opportunity for interrogating practice (Best Care Always, 2011). Audits, compliance and feedback are important within an antimicrobial stewardship programme (Du Toit, 2012). An audit is the collection of information relating to clinical practice to improve patient outcomes; this information is measured against an agreed standard (Gould, 2008) and is used in a process of 'benchmarking' as a quality improvement initiative (Gopalan, 2014).

A nursing participant reported that monthly surveillance data was compiled with the assistance of the laboratory. The private laboratory providing support to the antimicrobial stewardship programme receives data from all private hospitals in South Africa which allows important interpretation of not only local data here in Durban but also across the country. This is an important aspect of antimicrobial stewardship which allows understanding of local resistance patterns and contributes towards national surveillance (Madaras-Kelly, 2003; Brink, Moolman, Cruz da Silva *et al.* 2007; Centre for Disease Control, 2013). National and local protocols on bacterial resistance help in understanding potential challenges in the hospital setting (Kollef and Micek, 2012). A non-nursing participant said that there appeared to be a current decrease in the use of Rocephin locally which may be linked to a decrease in ESBL (extended-spectrum  $\beta$ -lactamase) rates, especially amongst the *Klebsiella*'s and that



this could be due to the increased awareness of antimicrobial stewardship within this unit (Madaras-Kelly, 2003; Brink, Feldman, Richards, Moolman and Senekal, 2008).

The resistance profile among Gram negative bacilli in South Africa is of concern. Of 1241 blood culture isolates tested, ESBL production in *E. coli* ( $N=503$ ) was 5%, ESBL production in *K. pneumoniae* ( $N=548$ ) was 50% and ESBL production in *Enterobacter* spp. ( $N=190$ ) was 23% (Brink, Feldman, Richards *et al.* 2008). Resistance within hospitals is often institution specific and solutions need to be tailored to the institutional needs (Cunha, Varughese and Mylonakis, 2013). Systematic surveillance along with the implementation of policies to guide prescribing can decrease nosocomial resistance. A study of 50 intensive care units, from 20 hospitals in the United States of America, received feedback on their vancomycin use, nosocomial rates and procedure rates. Twelve of the hospitals changed their policy in vancomycin use and each of these hospitals saw a decrease in vancomycin-resistant *Enterococci* (Madaras-Kelly, 2003). The ‘*World Antibiotics Awareness Week*’ held during November has brought attention to the difficulty of surveillance with comprehensive data needed to be collected over years (World Health Organisation, 2015)

#### 5.2.1.2 ADVOCACY ROLE

Participants showed their concern for patient wellbeing. Nurse advocacy was demonstrated by nursing participants as they voiced their concerns regarding their perception of inappropriate antimicrobial therapy and prolonged length of treatment periods within this ICU. Non-nursing participants were in agreement and added their concerns about the poor de-escalation practices. Both nursing and non-nursing participants linked microbial resistance to the overuse of antimicrobial treatment and were concerned that this had resulted in fewer effective antimicrobials to treat infections. Overuse of antimicrobials within the community was also raised by participants as a worrying factor with regard to increasing resistance.

Nursing participants felt strongly that patients should be given the correct antimicrobial treatment for an infection and that they had a responsibility to promote the interests of the patient. All participants interviewed showed a good understanding of antimicrobial stewardship and that the aim is to promote the appropriate use of antimicrobials with the correct choice of antibiotic/antifungal, the optimal duration, the correct dose, and the correct route of administration (Dryden, Cooke and Davey, 2009; Cunha, Varughese and Mylonakis, 2013). Empirical assessment of likely infective organisms is needed and the most appropriate

antibiotic chosen based on the site and severity of infection and knowledge of local antibacterial resistance patterns (SAMF, 2012). Objectives of correct antimicrobial therapy are to promptly start empiric therapy on patients who need antibiotics or antifungals, to obtain cultures as soon as possible and to de-escalate treatment when sensitivity is known (Best Care Always, 2011).

De-escalation was raised as an important aspect of correct antimicrobial management by several non-nursing participants with one non-nursing participant adding that this is not being done quickly enough. Participants were concerned about the high use of broad-spectrum therapy in the ICU (Brink, Botha, van den Ende *et al.* 2003; Jacob and Gaynes 2010). De-escalation of antibiotic therapy is strongly recommended as soon as susceptibility profiles have been identified (Farrer, 2011; Katsios, Burry, Nelson *et al.* 2012). Antimicrobial best practice was described by a non-nursing participant as right drug, right dose, de-escalation when possible, and right duration (Dellit, Owens, McGowan *et al.* 2007; Doron and Davidson, 2011). Appropriate empiric therapy should be confirmed by MC&S and antibiograms, adjusted where necessary and de-escalated as soon as possible (Blot, 2015).

A study into the prevalence of infection in South African ICUs (PISA) was conducted by committee members of the Critical Care Society in South Africa. A sample of 240 patients was taken from 40 ICUs within both the private and public healthcare sectors with 65.7% of patients from private units. Findings within the private patient group were that an inappropriate antibiotic was prescribed in 60.8% of these patients, de-escalation was used in only 19.7% of the patients and antibiotic duration was inappropriate in 81.7% of the patients. All these figures were higher than that for the public sector patients (Paruk, Richards, Scribante *et al.* 2012).

Many participants, both nursing and non-nursing, stated that they were aware of the overuse of antimicrobial therapy by doctors and expressed disapproval of some of the choices of treatment (Paruk, Richards, Scribante *et al.* 2012). Participants identified the inappropriate use of antimicrobial therapy as potentially impacting on the environment of the intensive care unit and should be used less often to reduce the risk of bacterial resistance. They also suggested that poor choices of treatment resulted in ineffective management of infections and prolonged the stay of critically ill patients in the unit (Mendelson, Whitelaw, Nicol *et al.* 2012). Richards (2010) states that combination therapy should be added to empiric therapy if

resistant or Gram positive infections are suspected with a surgical patient, this however increases the potential for adverse effects and cost (Farrer, 2011).

Non-nursing participants in particular identified increasing bacterial resistance as an issue that had great significance for the effective management of critically ill patients (Richards, 2010; Edwards, Drumright, Kiernan *et al.* 2011; Fry, 2012; Mendelson, Whitelaw, Nicol *et al.* 2012). This is seen to be linked to the overuse and inappropriate choice of antibiotics (Doron and Davidson, 2011). Correct antibiotic use is necessary to reduce selection pressure for resistance (Majumdar and Padiglione, 2012). Pan-resistant Gram negative and highly resistant Gram positive organisms are prevalent in ICUs; factors associated with resistance are; hospitalization, immunosuppression, postoperative infection, recent antibiotic therapy and residence in long-term care facilities (Richards, 2010). Risk factors for resistant organisms are prolonged time spent in a healthcare institution, the use of antibiotics and invasive lines, and the debilitated state of the patient (Lucet, Koulenti and Zahar, 2014). Very ill patients are compromised by infections that are difficult to manage and this results in longer stays in intensive care, and increases the number of healthcare personnel who are needed to care for them as well as other healthcare costs (Edwards, Loveday, Drumright *et al.* 2011). A non-nursing participant was concerned about the increasing prevalence of resistance in *Candida*. The use of certain antimicrobial therapy such as carbapenems increases invasive *Candida* infections which can be very difficult to manage and require extended expensive antifungal therapy (Jensen, Hein, Lundgren, Bestle, Mohr, Andersen, Løken, Tousi, Sørensen, Lauritsen, Strange, Petersen, Thormar, Larsen, Drenck, Helweg-Larsen, Johansen, Reinholdt, Møller, Olesen, Arendrup, Østergaard, Cozzi-Lepri, Grarup and Lundgren, 2015).

Participants felt that one of the aims of antimicrobial stewardship is to conserve antibiotics and were concerned that antibiotics are becoming less effective. The focus of antimicrobial stewardship should be the responsible use of a critical and threatened healthcare resource (Ziady, 2012; Centre for Disease Control, 2013). Antimicrobials have become a scarce resource due to bacterial resistance to both antibiotics and antifungals. However, the high cost of research and development prohibits the production of new antibiotics (Cars, Diaz Högberg, Murray, Nordberg, Sivaraman, Stålsby Lundborg, So and Tomson, 2008; Farrer, 2011). In a study assessing the risk factors for the spread of carbapenem-resistant *Enterbacteriaceae* in South Africa, microbiologists and intensivists warned that antibiotics

that were able to manage such infections were not yet available (Brink, Coetzee, Clay *et al.* 2010).

The lack of new antibiotics in the ‘pipeline’ to treat resistant pathogens was discussed at the *Antimicrobial Resistance Summit* held in 2011 (Gottlieb and Nimmo, 2011). The move of the pharmaceutical industry away from the development of new antimicrobial agents is of concern (Spellberg, Bartlett and Gilbert, 2013). Gould and Bal (2013) state that this is mainly due to financial considerations; firstly, the nature of antibiotic use which is usually of short courses, unlike medication for chronic conditions which may be for a lifelong need. A second factor concerns the unbalanced market-driven development of antimicrobial agents such as products for the control of methicillin-resistant *Staphylococcus aureus* (MRSA) compared with Gram-negative pathogens such as *A. baumannii*, ESBL-producing *E. coli* and *Klebsiella* and *P. aeruginosa*. The third factor is the uncertain future of a product where there may be possible resistance to a newly developed antibiotic which then may no longer be needed.

The use of antibiotics in the community for viral infections such as colds and flu was seen to be a problem for both nursing and non-nursing participants. Participants said that this seemed to be because of consumer pressure on primary health care providers (Cars, Diaz Högberg, Murray *et al.* 2008; Fry, 2012) and was seen by participants as contributing towards bacterial resistance (Doron and Davidson, 2011). Use of antibiotics in primary healthcare is estimated at 80% (Dryden, Cooke and Davey, 2009). One of the major challenges facing healthcare today is the lack of public understanding of the risks associated with taking antibiotics. Sir Alexander Fleming (1945:93) made this point when delivering his famous Nobel Prize speech ‘The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily under dose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant. Here is a hypothetical illustration. Mr. X. has a sore throat. He buys some penicillin and gives himself, not enough to kill the streptococci but enough to educate them to resist penicillin. He then infects his wife. Mrs. X gets pneumonia and is treated with penicillin. As the streptococci are now resistant to penicillin the treatment fails and Mrs. X dies’. In the United Kingdom (UK) there has been a move towards broadening over the counter medications. At present all antibiotics are prescription-only medicines under the Medicines Act, 1968, but applications are increasing for antibiotics to be available as over the counter (Dryden, Cooke and Davey, 2009). This is worrying and wider education of the public is of the greatest importance (Cars,

Diaz Högberg, Murray *et al.* 2008). In 2008 in the UK, the Chief Medical Officer's report stated 'Every antibiotic expected by a patient, every unnecessary prescription written by a doctor, every uncompleted course of antibiotics, and every inappropriate or unnecessary use in animals or agriculture is potentially signing a death warrant for a future patient' (Dryden, Cooke and Davey, 2009:885). In 2015, the same Chief Medical Officer has warned that modern medicine is 'finished' unless the problem of antibiotic resistance is dealt with (Davis, 2015).

Approximately 50% of antibiotics used in humans and up to 80% of antibiotics for veterinary use are most likely inappropriate and unnecessary (Dryden, Cooke, Davey, 2009). Large quantities of antimicrobials are used in livestock production and resistance is not only confined to human medicine (World Health Organization, 2011; Woolhouse and Ward, 2013). A study conducted in the USA in 2006 found that an estimated 70% of antibiotics and related drugs were used primarily to promote growth and to manage chicken, pigs and cattle in crowded modern farming practices (Clouse, 2006). In 2009 in the USA, over 3 tons of antibiotics was recorded in human consumption and in 2010, in the same country, over 13 tons of antibiotics were used in animal farming (Spellberg, Bartlett, and Gilbert, 2013). Legislative change has however been slow. In 1998 the European Union regulated against using antibiotics that are used in human medicine as growth promoters in livestock (Clouse, 2006) and more recently the UK Department of Health published a 5-year antimicrobial resistance action plan that has targeted veterinarians and farmers as well as clinicians and their patients (Woolhouse and Ward, 2013).

There is widespread ignorance amongst healthcare workers of the many ways that individuals and communities are exposed to resistant pathogens; through increased travel, through the dietary intake of animal products and contamination of water tables by animal waste products, through cleaning agents used in the home, through exposure to antibiotic therapy and through exposure to healthcare environments (Dancer, 2013). Household cleaning products may cause resistant microbial variants (Levy, 2001) and as recently as 2013 a well known cleaning product was taken off supermarket shelving in South Africa for this reason (Loudon, 2014). As health professionals, nurses need to be aware of challenges in antimicrobial stewardship, beyond the walls of the ICU and a hospital environment, and recognize responsibility in a time when antibiotic resistant pathogens are increasing in virulence and infectious diseases pose such a threat to public health (Clouse, 2006).

Participants felt that public education was important to inform communities of the problems associated with unnecessary antibiotics (Cars, Diaz Högberg, Murray *et al.* 2008; Fry, 2012; Charani, Castro-Sánchez and Holmes, 2014). ‘The International Council of Nurses (ICN), believes that nurses are key to improving access to quality and cost-effective care and to enhancing the health of populations. To this end it is essential that nurses are able to effectively influence change at local, organizational, systems, national, regional, and international levels’ (Benton, 2012:1). There is poor management of infections both in formal healthcare institutions and in communities across the world. A person’s perception of illness is strongly influenced by culture and the society in which they live. A patient must therefore be considered within a specific context and information regarding the condition and advice concerning the best way to treat it, should be adjusted to that context (Cars, Diaz Högberg, Murray *et al.* 2008). Nurses play a central role in public education to teach the public about hygienic practices, and how to avoid passing on infections (Gallagher and Storr, 2012) and to reassure patients that colds and coughs do not generally need antibiotic treatment (Fry, 2012; Dancer, 2013). In Thailand’s ‘*Antibiotics Smart Use Program*’ a behavioural change initiative targeting doctors and patients has been successfully introduced as part of national stewardship with patients suffering from upper respiratory tract infections given evidence-based herbal remedies for simple colds and coughs instead of antimicrobial therapy (Charani, Castro-Sánchez and Holmes, 2014).

#### 5.2.1.3 CLINICAL ROLE

Participants raised clinical issues relating to the intensive care nurse’s role in antimicrobial stewardship. These were the ongoing monitoring of the critically ill patient in order to identify early signs of infection, the correct administration of antimicrobial therapy and infection prevention and control. All participants viewed monitoring of the patient’s condition as including the ongoing assessment of the clinical parameters of the patient. This is seen as a primary function of nurses by Kutney-Lee, Lake and Aiken (2009) who identify the components of monitoring as ongoing observation and assessment, recognition of changes and the significance of these changes and decision-making and is enhanced by educational background, clinical experience and specialist competencies. Little attention has been given to those aspects of clinical nursing practice that may contribute to the development of antimicrobial resistance (Edwards, Loveday, Drumright *et al.* 2011).

Nursing participants said that a large part of their responsibilities was the daily monitoring of microbiology reports, infective markers and blood cultures by shift leaders to identify infections. Risk factors for infection in ICU include an impaired host defence mechanism due to severe illness, malnutrition, immune compromise and invasive devices. Other risk factors are the inappropriate use of antimicrobial therapy, prolonged length of stay, mechanical ventilation and lack of adequate infection control and antimicrobial protocols (Perovic, 2011). The monitoring of antibiotic 'days', invasive line 'days' and endotracheal tube 'days' was identified by participants as an important part of the ICU nurse's role in antimicrobial stewardship (Vasuthevan, 2012). Invasive lines such as central and arterial lines and urinary catheters were monitored to determine days of insertion and potential for infection. Daily rounds were conducted by the shift leaders to ensure compliance with record keeping and appropriate interventions by the floor nurses such as prompt removal of invasive lines when possible.

Nursing participants stated that daily monitoring of infective markers such as PCT were part of routine care with ill patients in the unit. The monitoring of infective markers in critically ill patients is essential to guide antimicrobial therapy (Kollef and Micek, 2012). C-reactive protein (CRP) levels are no longer regarded as useful indicators of infection and are seen to be misleading as surgical interventions result in an increased CRP. Procalcitonin (PCT) levels have been found to show a better correlation with clinical severity and are useful in guiding antimicrobial therapy in the ill patient (Schuetza, Raadb and Aminc, 2013). It is important to differentiate between an inflammatory response and the infective process. The immune response generally results in a rise in temperature but fever and leucocytosis are signs of an inflammatory response and not necessarily an indication of infection. If a PCT is low, antibiotics are not indicated but a raised PCT along with a rise in white cell count and leucocytes is a reliable indication that an infective process is occurring in the patient with levels rising swiftly within two to four hours and normalizing with recovery (Hayashi and Paterson, 2011). However, features of sepsis that continue several days following the antibiotic intervention may mean that there has been inadequate source control (Richards, 2010).

Nursing participants stated that specimens for MC&S were taken by the floor nurse on insertion of invasive lines and on intubation of the patient in order to monitor for nosocomial infections. South African microbiologists Wasserman, Boyles and Mendelson (2014), have

provided guidelines for taking specimens in order to minimise specimen contamination which might lead to unnecessary antibiotics. Recommendations are also that “sterile site” cultures, such as blood cultures, are more reflective of true infection than “non sterile site” cultures such as a positive endotracheal aspirate, wound or urine culture which are more likely to be contaminated or colonized (Katsios, Burry, Nelson *et al.* 2012). Nursing participants said that blood cultures were taken when indicated however one nursing participant said that this had to be discussed with the shift leader and the specialist managing the patient. Blood stream infections occur in approximately 15% of critically ill patients (Afshari, Pagani and Harbarth, 2012). ‘Surviving Sepsis Campaign’ recommendations include 6 care elements necessary to reduce morbidity and mortality from severe infection. One of these is that blood cultures need to be taken before antibiotics are commenced (Dellinger, Levy, Rhodes *et al.* 2012). All participants noted that the floor nurse caring for a patient received the laboratory reports for that particular patient and that the nurse had a duty of care to read and understand these reports and to communicate positive finding to the relevant doctors. Antibigram results were closely monitored for appropriate response to microbial sensitivity and this was seen by both nursing and non-nursing participants as an important aspect of the nurses’ monitoring role.

Most of the nursing participants and two non-nursing participants identified infection control in an ICU as an essential part of the antimicrobial stewardship programme in order to actively address the problem of hospital-acquired infections (Best Care Always, 2011). Infection control in the private healthcare sector in South Africa is often seen as an area that is the specific concern of nurses. This should be an area of collective responsibility (Mendelson, Whitelaw, Nicol *et al.* 2012). Surveillance, hand hygiene compliance, isolation precautions, environmental cleaning, auditing, measuring of compliance and feedback and positive reinforcement have been promoted by FIDSSA (2012) as part of the role of the infection control practitioner within an antimicrobial stewardship programme.

Infection control has become part of general hospital management and nurses recognize this as being an integral part of intensive care protocol with a dedicated infection prevention and control nurse allocated to these programmes. The patient who requires admission into an ICU is often compromised by trauma, extensive surgery or chronic disease such as HIV or tuberculosis and is vulnerable to opportunistic infections and hospital-acquired infections. Contributing factors to infection in the critically ill patient are poor nutrition, hypotension, ischaemia and reperfusion, trauma and therapy with corticosteroids or immune suppressives



(Mer, 2003). ICUs can be 'hot spots' for infection if infection control is not carefully implemented (Rice, 2003) and infection control practices need to be closely scrutinized for the purpose of identification of resistant pathogens within the unit environment (Essack, 2006). The increasing number of hospital-acquired infections and antibiotic resistance is linked to the indiscriminate use of antibiotics which 'exerts a detrimental selective pressure on the broader bacterial ecology' (Dryden, Cooke and Davey, 2009:1). Antimicrobial resistance emerges in the intensive care environment through selective pressure from antibiotic use and nosocomial transmission by healthcare workers (Majumdar and Padiglione, 2012) and those patients who develop infections from resistant pathogens generally require prolonged medical treatment (Edwards, Loveday, Drumright *et al.* 2011).

Ventilator-associated pneumonia (VAP) was identified by nursing participants as a common hospital-acquired infection in ICU. Risk factors for ventilator-associated pneumonia include age over 70 years, chronic lung disease, aspiration and previous antibiotic exposure and is the second leading cause of nosocomial infection in ICU following urinary tract infections (Afshari, Pagani and Harbarth, 2012). It is defined as a pneumonia occurring between 2 and 3 days after a patient is placed on mechanical ventilation (Gillespie, 2009) and results in increased levels of morbidity and a mortality of 70% (Freeman, 2010). Care bundles for the prevention of ventilator-associated pneumonia initially included the elevation of the head of the bed to 30 degrees at all times to minimize micro-aspiration of secretions, daily sedative interruption and evaluation of readiness for extubation, peptic ulcer prophylaxis and venous thromboembolism prevention (Majumdar and Padiglione, 2012). Revised VAP care bundles have replaced the latter two interventions with subglottic secretion drainage, the use of chlorhexidine in mouth care and initiation of early enteral feeding to minimize translocation of gastrointestinal organisms (Best Care Always, 2012).

A nursing participant felt that ventilator-associated pneumonia was linked with the aspiration of secretions from the mouth. There has been widespread concern that nasopharyngeal secretions seep down into the lungs past the endotracheal cuff (Lawrence and Fulbrook, 2011) and strategies for preventing ventilator-associated pneumonia include reducing colonization and aspiration (Majumdar and Padiglione, 2012). Control of gravitational seepage of these secretions by using a sub-glottic device that provides a continuous suction is seen to minimize aspiration of bacterial contaminated secretions that accumulate above the cuff of the endotracheal tube (Perovic, 2011). This device has been shown to reduce the

incidence of ventilator-associated pneumonia but not length of stay in ICU or mortality (O'Grady, Murray and Ames, 2012). Oral care, the avoidance of accumulation of secretions and adequate cuff pressure are the three goals of prevention of micro aspiration (Blot, Poelaert and Kollef, 2014).

Participants did not mention managing endotracheal cuff pressure when discussing infection control aspects of the nurse's role in antimicrobial stewardship. The maintenance of an adequate cuff pressure is important for adequate tidal volumes and ventilation but also to prevent pharyngeal secretions from seeping down into the lungs and starting an infective process. In a South African survey carried out by Jordan, van Rooyen and Venter (2012), poor cuff practice was noted in private ICU and this was attributed to the high levels (36%) of agency nurses which are used to augment permanent staff. Current practice in South African ICUs is to measure the cuff pressure several times over the course of a 12 hour nursing shift. A worrying variation in endotracheal cuff pressures was noted when pressures were measured continuously and occurred both with patient movement and during nursing and other healthcare staff interventions and were not identified with routine intermittent measuring (Memela and Gopalan, 2014).

Nursing participants reported that hand washing and care bundles were used primarily in this ICU as the basis of its infection control. Infection control and hygiene are integral to control the spread of bacterial resistance (Paterson, 2007). Strategies used for infection prevention can be placed in two main groups; vertical interventions which monitor, screen and treat for a specific important pathogen, such as MRSA, and horizontal interventions which aim to avoid all infections and include hand hygiene, chlorhexidine bathing, and care bundles. The former are costly and the latter require compliance from healthcare workers in order to be effective (Edmond and Wenzel, 2013). Although hand washing was known to be important and training was reported to be ongoing, concern was expressed by some of the nursing participants that this was not happening as it should.

Hand washing has been shown by extensive studies to be the most important evidence-based intervention for the prevention of transmission of pathogens as a result of direct contact but despite widespread education healthcare workers do not wash/ spray their hands with compliance found to be only 40% in ICUs in South Africa (Brink, Feldman, Duse *et al.* 2006). In an earlier South African study *Candida albicans* was found on the hands of 39% of

ICU staff (Mer, 2003). Acceptance of poor standards of hygiene in intensive care units may contribute to blood stream infections with pathogens such as *Pseudomonas aeruginosa*, *Acinetobacter* species, *Stenotrophomonas maltophilia* and *Candida* species which result from hand contamination of central lines by healthcare workers (Mer, 2006).

A study into the control of carbapenem-resistant *Pseudomonas aeruginosa* showed that hand washing correlated with a reduction in this pathogen and confirmed the importance of infection control measures as part of antimicrobial stewardship programmes (Dos Santos, Jacoby, Machado, Lisboa, Gastal, Nagel, Kuplich, Konkewicz and Lovatto, 2011). Monitoring and tracking poor infection control in a unit by healthcare workers has been identified as an important way of providing feedback to the antimicrobial stewardship team and can contribute to decision-making regarding the need to audit behaviour and plan further educational programmes. Poor hand washing in particular can be confirmed by strain typing and will then confirm the need for education focused on infection control in that particular area (Essack, 2006; Deege and Paterson, 2011).

Another clinical aspect identified by participants as part of the role that the ICU nurse plays in antimicrobial stewardship was the coordination of antimicrobial therapy, ordering antibiotics from the pharmacy and the correct administration of antibiotics. Nursing participants indicated that a collection of original antibiotics was kept in ICU to reduce 'hang time' when starting a patient on an antibiotic. This was a new initiative in the ICU and was felt to be necessary because of prolonged delays in the delivery of stock from pharmacy. Guidelines for the management of patients with septic shock or severe sepsis are that broad spectrum antibiotics are given within an hour of diagnosis. These should be available in clinical areas to prevent delay in administration (Peel, 2008). There may be a misunderstanding currently regarding this one hour period with the misconception that all patients in ICU who have been prescribed antibiotic treatment must have this within one hour. This is part of the *Surviving Sepsis Campaign Guidelines* (SSC) and refers specifically to patients in a clinical crisis due to infection (Dellinger, Levy, Rhodes *et al.* 2013). Hranjec and Sawyer, (2013) suggest that withholding antibiotics while waiting for more information about the infection may not be necessarily harmful to patients who do not fall into the categories described by the SSC guidelines.

#### 5.2.1.4 COLLABORATIVE ROLE

Participants identified the collaborative role of the ICU nurse in the antimicrobial stewardship team as conducting shift leader ward rounds, participating in doctors' rounds and attending the weekly teleconference antimicrobial stewardship meetings. Participants said that the antimicrobial stewardship team in this ICU was made up of the nurses working in the unit, microbiologists and specialists. The role of the ICU nurse within the antimicrobial stewardship team was seen as being very important by both nursing and non-nursing participants. Engaging the frontline staff is an important factor in ensuring the success of antimicrobial stewardship and was one of the TCAB principles (transforming care at the bedside) presented at the *Forum for Professional Nurse Leaders* conference (Vasuthevan, 2012).

Nursing participants reported a hierarchical nursing structure within the unit with the floor nurse working closely with the shift nurse throughout the day. Frequent communication about decision making took place regarding the condition of patients, infective markers and the need for antimicrobial therapy. Shift leaders would then discuss developments with the unit manager who was in regular contact with the infection control coordinator. Daily review of antimicrobial prescriptions, chest x-rays and microbiological laboratory reports were noted by a non-nursing participant as important in managing a patient in intensive care (Hamilton and Fishman, 2014). Doctors' rounds were identified by both nursing and non-nursing participants as an opportunity for discussion about the condition of the patient. Medical specialists routinely visit the ICU in the morning and in the late afternoon to conduct 'rounds' in which they 'see' patients under their care. At this time they assess the condition of the patient and discuss any treatment that is required with the floor nurse allocated to look after that particular patient. Response to antimicrobial therapy is assessed by reviewing clinical changes and infective marker trends and further laboratory tests are ordered if necessary. If a nurse needed to discuss a patient with the doctor during the remainder of the day, or night, when the doctor was not physically present in the unit, the floor nurse or the shift nurse would contact the doctor by telephone.

There is great awareness of the challenges posed by bacterial resistance in the country amongst microbiologists in South Africa with a continuous surveillance organisation involving all academic/public and private sector laboratories conducted by the National Antimicrobial Surveillance Forum (NASF) (Brink, Moolman, Cruz da Silva *et al.* 2007).

Nursing participants felt that there had been very effective guidance of the antimicrobial stewardship programme in this ICU by microbiologists working for private laboratories and this was seen as vital to the success of the initiative. This support allowed very important analysis of patient care and plan of treatment and may have been useful when doctor support was lacking. This contact with the microbiologists also facilitated surveillance data collection by the infection control nursing coordinator (Charani, Cooke and Alison, 2010).

### 5.2.2 “BEING PROACTIVE” IN THE DEVELOPMENT OF THE NURSE’S ROLE

Participants suggested that proactive development of the intensive care nurse’s role in antimicrobial stewardship could be achieved by the nurse taking responsibility for safe patient care, by engaging in ongoing learning within the antimicrobial programme and by actively contributing to the work of the team.

#### 5.2.2.1 TAKING RESPONSIBILITY FOR SAFE PATIENT CARE

Participants felt that the intensive care nurse has a responsibility for an active role within the antimicrobial stewardship team. This related to taking responsibility for self-development and for safe patient care. Participants referred to the correct administration of antimicrobial therapy to minimize bacterial resistance. Nursing participants used ‘*Best Care, Always*’ guidelines to ensure evidence-based clinical practice. A non-nursing participant identified a shift in the doctor/nurse relationship as an interesting development in team dynamics. A non-nursing participant felt that it was the duty and responsibility of the intensive care nurse to act proactively when dealing with other members of the health team. Nurses should participate in decision-making by active listening which involves questioning and voicing opinions (ACCN, 2005). Another non-nursing participant felt that nurses needed to be aware of their own needs for self-development and act upon these (Davids, 2006).

Kleinpell (2013) defines responsibility as a duty to the profession of nursing and accountability as to how one exercises this responsibility. Participants, particularly non-nursing participants, suggested that nurses in ICU need to be proactive in their approach to patient care. From the responses given in the interviews it seemed that proactive behaviour included the ability to pay attention to detail, and the ability to be able to read laboratory reports and understand the significance of what they are reading. Not understanding or missing important laboratory information can lead to adverse events. If the nurse does not have the competencies to recognise a newly identified pathogen in microbiology laboratory

reports, and does not understand the significance of this with regard to the management of the ill patient, this may not be brought to the doctor's attention. If the nurse does not understand the challenges of antimicrobial resistance or know and understand current antimicrobial guidelines, the significance of a particular prescription may be missed. And if the nurse does not have the skills to diplomatically discuss a treatment choice with the doctor, that patient's care may be compromised.

Nursing participants suggested that ICU nurses might not prepare and administer antibiotics correctly. Structures need to be put in place in order to ensure that nurses are not placed in the position of having to rely on 'the nurse next to them' for guidance with regard to the way in which to mix and administer an antibiotic. Medication errors include not only the incorrect choice of a medication but the incorrect preparation and administration of a *correct* drug (Welters, Gibson, Mogk and Wenstone, 2011). Supporting knowledge acquisition through immediate access to technology could assist nurses with understanding laboratory reports and antimicrobial treatment. Increased availability and access to medication information through electronic devices and computerized systems has been found to reduce medication errors from 27% to 3.4% (Michell, 2006).

Nursing knowledge and competencies must be kept up to date with the changes in clinical practice (Coombs, 2006; Fulbrook, Albarran, Baktoft and Sidebottom, 2012) as the nurse's scope of clinical practice is constantly evolving in response to changes in healthcare needs (Dancer, 2013; Woolhouse and Ward, 2013). Evidence-based practice is now assumed to be the basis of professional practice in all health-related disciplines (Chaboyer, 2005) and has replaced traditional reliance on personal nursing experience and expertise (Perrie, Schmollgruber, Bruce and Becker, 2014). All nursing education should be evidence-led and maintaining contact with current issues in nursing is integral in effective preparation of nurses for clinical practice (Kleinpell, 2005). The ICU nurse has the responsibility of being aware of best practice research literature and using this as the basis for evidence-based clinical practices, such as the link between clinical practice and a nosocomial infection like ventilator-associated pneumonia (Kleinpell, 2006). Once concerns have been substantiated by research, evidence-based policy can be developed in order to effect changes in the practice of nursing (Chaboyer, 2005; Benton, 2012). Failure to address morbidity and mortality occurs when evidence-based therapies are not fully implemented in clinical practice (Weiss and Wunderink, 2013).

Protocols, policies, guidelines and checklists should be made available by hospitals to guide clinical practice (Chang, Sevransky and Martin, 2012) and are important in ensuring patient safety (Kangasniemi, Vaismoradi, Jasper and Turunen, 2013). An ICU is a complex environment with increased risk for error (Welters, Gibson, Mogk *et al.* 2011). The goal in patient safety is to reduce extrinsic risk caused by the process of care to a patient who is already compromised by intrinsic physiological risks (Valentin, 2013). It is often the case that it is accepted as the norm that things will go wrong in an ICU (Gillespie, 2014) however nurses have an ethical responsibility to prevent harm (SANC, 2013). Nursing participants did not refer to policies or guidelines during the interviews but mentioned the use of bundles as an important part of ensuring that evidence-based care was carried out. This refers to the South African ‘*Best Care, Always*’ initiative that has been promoted in an attempt to reduce hospital-acquired infections within the country. Care bundles have become an accepted way of reducing the gap between research and clinical practice (Fulbrook, 2005) and are comprised of high level evidence (Gillespie, 2007). However, Harvey, Loftus-Hills, Rycroft-Malone, Titchen, Kitson, McCormack and Seers (2002) emphasize the importance of the nurse facilitator regarding the effective uptake of evidence into practice.

#### 5.2.2.2 FURTHER EDUCATION OF THE NURSE IN AS

Non-nursing participants identified the working environment as important for providing opportunities for learning. Participants said that ICU nurses needed to be involved in the antimicrobial stewardship programme in order to increase nurse awareness of stewardship. In-service training was suggested as a useful way of improving nurse knowledge of current issues such as antimicrobial stewardship.

Suggestions made by the participants towards the development of the nurse’s role in antimicrobial stewardship and the antimicrobial stewardship team in this ICU, were to encourage nursing involvement and promote awareness of the importance of intensive care nurses in antimicrobial stewardship (Edwards, Loveday, Drumright *et al.* 2011). The training and education of nurses to increase awareness of antimicrobial use will facilitate optimal antimicrobial treatment, monitoring and administration (Carlton, Ryan, Ali and Kelsey, 2007; Crigger, 2008; Edwards, Drumright, Kiernan *et al.* 2011; Fry, 2012). Improving nursing awareness of antimicrobial use and impact of antibiotic therapy on infection outcomes will contribute to the goals of antimicrobial stewardship (Edwards, Drumright, Kiernan *et al.*

2011). Suggestions were also made by the participants to include ICU nurses in the weekly teleconference and to start a weekly nursing antimicrobial stewardship bedside round.

Gillespie, Rodrigues, Wright, Williams and Stuart (2013), support the involvement of the nurse at the bedside of the patient in the antimicrobial stewardship initiative and found an interventional study to be successful when an education package was developed encouraging nurses to be actively involved in a de-escalation programme. Increases in knowledge between pre and post education were; 14% to 28% for questioning the need for antibiotics, 59% to 79% for increased awareness of the risk of multi-resistant organism colonization or infection and 38% to 70% for the identification of line-related infection as a risk of IV therapy.

Participants recommended that educational opportunities be created in order to ensure that ICU nurses understood the principles of antimicrobial stewardship (Harvey, Loftus-Hills, Rycroft-Malone *et al.* 2002; Brink, Feldman, Richards *et al.* 2008). In-service training was seen by participants to be an important aspect of supporting the educational needs of the clinical nurse (Danielson and Berntsson, 2007). This should be relevant to clinical practice, held within working hours and well planned to meet particular needs within an institution. Sufficient time should be allocated to allow the successful implementation of the learning experience to meet intended goals (Norushe, van Rooyen and Strumpher, 2004).

No nursing participants referred to the professional nurses' responsibility for self-development or to the proposed SANC requirement for continuous professional development. For the intensive care nurse, continuing nursing education is integral to lifelong learning and obtaining relevant competencies and vital to keep nurses in these acute care areas up to date with the changing needs of clinical practice (Williams, Schmollgruber and Alberto, 2006; Moleki, 2008; Richards and Potgieter, 2010). Teaching institutions need to provide different methods of education which allow flexibility for nurses which allow them to work in the clinical environment while keeping studying. These options may include distance learning courses with on-line chat-room tutorials and study block options (Williams, Schmollgruber and Alberto, 2006; Moleki, 2008).

Coombs (2006) suggests that lifelong learning is essential to effective nursing and that the nurse needs to engage in continuous professional development (CPD) in order to meet the challenge of change and ensure that best care is delivered. Professional development adds



credibility to nursing (Richards and Potgieter, 2010) and nurses as professionals should take responsibility for their educational needs and identify their own opportunities for ongoing learning (Moleki, 2008). Nurses surveyed in South Africa did not support a mandatory CPD system (Davids, 2006). Questions that should be raised with regard to this are; who and what is CPD for, how do nurses access this, how should CPD opportunities be provided as one approach may not be suitable for every nurse, and how does a nurse manage the demands of work, home life and the practicalities of CPD. Within this study, nurses raised concerns with regards to CPD affecting a work/life balance and voiced the perception of nurse managers acting as 'gatekeepers' to CPD opportunities and to using newly gained knowledge and skills (Gould, Drey, and Berridge, 2007).

The professional nurse is required to be registered with a controlling professional body which ensures competency to practice (Benner, 1982). Kaye- Petersen (2004) found that there was no formalised CPD system for nurses and midwives in South Africa and offered the *Final CPD System* to the Department of Health in South Africa for consideration but expressed concern regarding the capacity of SANC to administer and monitor the CPD system. The South African Nursing Council (SANC) has a mandate to protect the public through ensuring the competence of nurses and midwives and evidence of CPD is to be a requirement for renewal of the annual practice certificate without which a nurse may not practice in South Africa. The *Strategic Plan for Nurse Education, Training and Practice* 2012/13 – 2016/17 released by the Department of Health stated that the goal was that by 2014 there should be a CPD system ready for implementation for nurses and midwives (DOH, 2012).

At present SANC is conducting a feasibility study which is at a pilot phase and implementation of the CPD programme is planned for 2017/18. Nurses will be required to submit an annual declaration form to SANC prior to yearly renewal of registration with a minimum of 15 CPD points required each year made up of 4 different areas; ethical and legal, leadership and management, teaching and research and finally the area of practice. A portfolio of evaluation (POE), which shows proof of CPD, is to be maintained by every practicing nurse, and presented for evaluation if required during the auditing process (Bhengu, 2014).

### 5.2.2.3 IMPROVED TEAM COLLABORATION

Participants said that nurses were an important part of antimicrobial stewardship and the antimicrobial stewardship team. Teamwork was seen to be fundamental to the success of the antimicrobial stewardship initiative. Communication was identified by participants as a cohesive force within teamwork. A worldwide study conducted by Williams, Bost, Chaboyer *et al.* (2012) to determine the concerns of critical care organisations from different geographical regions, found that issues important to ICU nurses remained those of teamwork, education, development of practice guidelines and workforce, with teamwork concerns having become more important than a decade ago. It can be difficult to define the kind of work that occurs within a team. Interdisciplinary collaboration occurs when team members use the same language and relevant information is shared amongst the members in order to pursue a common goal. On the other hand, multidisciplinary collaboration refers to work being shared according to different skill sets (Atwal and Caldwell, 2006; Sheehan, Robertson and Ormond, 2007). Collaborative practices within this antimicrobial stewardship team in this ICU appeared to move between both of these types of teams.

Within the private healthcare sector in South Africa it is common for several specialists to care for a very sick patient (Mitchell, 2011). A doctor's round is generally a brief visit by one of these specialists in order to check on the patient's condition and to issue orders for investigations and treatment and can be conducted at any time of the day. Jutel and Menkes (2010), suggests that nurses may have more influence than they realise and this opportunity may be the perfect time for the ICU nurse to engage with the specialist regarding the clinical progress of the patient and the optimal management of an infection. Autonomy domains of nurses in intensive care were identified by Kramer and Schmalenberg (2008) as that of holistic patient care and coordination of that care. The ward round is an ideal time for the nurse to move away from being the 'silent partner' and to contribute proactively. This can also be a valuable time for junior nurses to see collaborative skills being used (Hill, 2003).

Participants identified communication as an essential skill for teamwork. The intensive care area is where the most interdisciplinary work takes place in the hospital environment (Stein-Parbury and Liaschenko, 2007). Nurses are central figures in the intensive care team and play a vital role in the coordination of patient care. As nurses are the only healthcare members within the private healthcare sector in South Africa to be in the ICU at all times, the ability to

communicate timeously and accurately to the doctor is paramount in providing optimal care to the patient.

The intensive care nurse often acts as a facilitator of planned treatment, and collaboration with the other members of a team requires effective communication. These skills are important in ensuring the successful implementation of an antimicrobial stewardship programme in an intensive care unit. Communication skills are an important aspect of the professional nurse's role but may be seen as 'soft' skills which are acquired naturally and not taught specifically during training. They are part of a nurse's personal skills, together with how one presents oneself, how one behaves in certain situations and the language that one uses when talking to others. Teamwork is an important aspect of working in an ICU and training needs to include the development of skills needed for this (Powell and Davies, 2012). Communication is the underlying basis of collaboration and should be open and direct amongst team members, different points of view should be respected and mutual responsibility must be taken for problem solving (Stein-Parbury and Liaschenko, 2007). Open communication is therefore essential between health professionals from different disciplinary backgrounds (Dickson and Flynn, 2012) and in order to carry out an antimicrobial stewardship programme of this nature, effective communication and coordinated effort is required between doctors, microbiologists, pharmacists and nursing staff (Centre for Disease Control, 2013).

### 5.2.3 MULTIFACTORIAL BARRIERS TO DEVELOPING THE NURSE'S ROLE

Participants raised concerns regarding the development of the nurse's role in antimicrobial stewardship. Resource barriers were identified as inadequate nursing education which has resulted in poor nurse clinical knowledge and competencies, a lack of experienced ICU nurses in the unit and a lack of time for in-service training. Knowledge barriers were said to be inadequate knowledge about infection control and the correct administration of medications. Barriers to proactive nursing were identified as poor nursing attitudes, poor attention to detail and lack of self-determination. Collaboration barriers perceived by nursing participants were that nurses were not part of treatment decision-making and that doctors sometimes behaved in a dismissive manner towards nurses. Collaboration barriers identified by non-nursing participants were that nurses were untrained and inexperienced and they were concerned that under qualified nurses were looking after their patients. Barriers from working in isolation were identified by nursing participants as a lack of support from

doctors and pharmacists and a lack of feedback about the antimicrobial stewardship initiative. Finally, participants identified several barriers due to economic pressures; firstly, the practice within the private healthcare sector of running ICU's as an 'open unit', secondly, the difficulty that this hospital had in providing pharmacist support to the programme and thirdly, medical aid organizations were seen as promoting less expensive generic antimicrobial therapies.

#### 5.2.3.1 RESOURCE BARRIERS

Barriers to the development of the nurse's role in antimicrobial stewardship were identified by participants as resource barriers in terms of skilled nursing staff. They said that there was a lack of experienced nurses available. Participants perceived basic nursing training to be inadequate and that nurses were not equipped for clinical practice. Nursing participants said that it was difficult to hold in-service training as the unit could become very busy and there were constant distractions.

Participants said that there was a shortage of experienced nurses available to work in the unit. A report by the Human Sciences Research Council, conducted over 20 years ago into the working conditions of nurses in intensive care in South Africa, stated that few nurses working in ICU had a qualification in intensive care (Cilliers, 1991). This is an ongoing concern and the nurse with a specialist certification in intensive care is still considered a scarce resource in South Africa (Moleki, 2008). Participants were concerned that the nurses in ICU were not trained intensive care nurses. 'It is essential that the need for specialist nurses be part of the detailed planning, as is the case for Medicine. An RN/M is prepared as a generalist with a wide range of relatively superficial competence in order to render a generalist level of care. A SRN/M is a professional person who has been prepared beyond the level of a generalist and is authorised to practise as a specialist in a field of nursing or midwifery' (Uys and Klopper, 2013:2)

In a nationwide audit of the critical care resources in South Africa Scribante and Bhagwanjee (2007) found that only 25.6% of nurses working in these units had ICU training and had fewer than 5 years' experience of working in an ICU. Nurses registered with SANC with a specialist certification in intensive care nursing numbered 2537 in 2005 (Pretorius and Klopper, 2012). Specialist registered nurses who have post RN training may be under recognised and underutilized as many SANC policy documents 'do not address the issue of

specialist nurses' (Uys and Kloppe, 2013: 1). The severe shortage of trained ICU nurses in South Africa is attributed by De Beer, Brysiewicz and Bhengu (2011) to the movement of these nurses to other countries. South Africa has been identified as a source country for the United Kingdom, despite lesser numbers of professionally trained nurses and South Africa's heavy burden of disease, with records showing that South Africa has 472 RNs per 100,000 in comparison to 782 RNs per 100,000 within the United Kingdom (Aiken, Buchan, Sochalski, Nichols and Powell, 2004). Factors contributing to nurses' emigration from South Africa were described as poor salaries, bad working conditions, unreasonable workloads, inadequate career pathways and concern about personal safety (Oosthuizen and Ehlers, 2007).

The shortage of ICU trained nurses in South Africa has led to hospitals employing registered general nurses and enrolled nurses to staff intensive and high care units. It is current practice in the private healthcare sector in South Africa to use enrolled nurses in ICUs to augment staffing levels (MedNurse Health Recruitment, 2015). Perrie (2006) refers to a decision by the Department of Health in South Africa (DOH, 2003) in which the placement of sub-professional nurses in ICUs was supported in order to address the shortage of registered nurses. Scribante and Bhagwanjee (2007) found that enrolled nurses working in ICUs in South Africa made up 21% of the nursing staff within this area.

The Draft Charter of Nursing Practice (SANC, 2004) was presented to nursing stakeholders for input regarding various considerations, one of which was the constraints of the current scope of practice of nurses. This made reference to the scope of practice for an enrolled nurse as 'restrictive and limiting'. It went on to say that in daily nursing practice, enrolled nurses are 'expected to assume responsibilities that are far beyond their scope of practice in most healthcare settings (SANC, 2004:3). Enrolled nurses have to be supervised by registered nurses as they have a restricted scope of practice (Schmollgruber, 2007). Scope of practice can be defined as outlining the role and boundaries of practice. Section 45 (1) (q) of the Nursing Act 1978 (Act 50 of 1978) Notice No. R. 2598 states that the first three aspects of the scope of the registered nurse includes; the diagnosing of a health need and the meeting of that need by the registered nurse or by referral to a registered person (the doctor), the execution of treatment prescribed by a registered person (the doctor) and the administration of medication to a patient including the physiological response to this medication (SANC, 1978).

Scribante, Muller & Lipman (1995) interpreted the Scope of Practice (R2598) of registered nurses with regard to the practice of certified ICU nurses. They state that this regulation is very broad and needs to be differently interpreted for different nursing specialities. Section a) states that the nurse should be competent to interpret actual or potential changes in the critically ill patient's condition and act appropriately in response to these changes. This competence should include knowledge, skills and values. Sections b), and c) state that the nurse should understand a treatment regimen, the reasons for this treatment, optimal administration of this treatment and the consequent monitoring of the patient's response to the treatment. The scope of an enrolled nurse does not include these three components discussed and it may be that enrolled nurses are not prepared within their training to manage the kind of complex dynamic situations that are found with managing the care of the critically ill patient.

The shortage of trained intensive care nurses in South Africa often results in hospitals in the private healthcare sector employing agency nurses to complement hospital nursing staff when the intensive care units are busy, however these nurses may not be able to deliver the standard of care required. Botha (2012) examined the factors that affected the competency of intensive care nurses in a South African study of nurses working in six ICUs in two academic tertiary hospitals. Nurses, in some instances, were found to make themselves available for agency work during days off and leave periods which may leave them unable to deliver the level of care required. 'Nurses were asked whether they work extra shifts as agency staff on their days/nights off (moonlight). The results showed that 84% of ICU qualified staff and 67% of non-ICU qualified staff worked as permanent members of staff in a hospital but also "moonlighted" (Botha, 2012).

#### 5.2.3.2 KNOWLEDGE DEFICIT

Knowledge barriers to the development of the nurse's role in antimicrobial stewardship were identified by nursing participants as the lack of understanding of ICU nurses of the principles of infection control and of the consequences of incorrect administration of antimicrobial therapy. Nursing participants said that '*Best Care, Always*' has been used within this ICU to support the antimicrobial stewardship initiative. One of the five pillars of the '*Best Care, Always*' infection prevention and control drive in particular provides guidance to ICU nurses with regard to best practice of ventilated patients however a nursing participant was concerned that ICU nurses may be disregarding this. This participant thought that ICU nurses

may be dropping the head of the bed below the recommended level when caring for patients. This nursing participant was not sure why the guidelines are not being followed.

Both nursing and non-nursing participants said that nurses need to understand not only how to mix antimicrobial treatment correctly but also how to administer it effectively. Treatment failure may result from the incorrect administration of an antibiotic (Blot, 2015). A nursing participant used an example of the concern of a dose of antibiotic placed in a 50 ml bag and run through a long administration set. This leaves as much as 30 mls in the tubing following the completion of the treatment. If an antibiotic is to be given at 8 hourly intervals, the substance in this tubing may no longer be stable but will be then administered with the next treatment, again leaving a substantial amount of the fresh mixture behind in the tubing. This will deliver an inadequate amount of the drug and will result in under dosing and subsequent bacterial resistance to this antibiotic/antifungal medication.

Knowledge is the first step in ensuring safe care to the patient (Perrie, 2006; Perrie, Schmollgruber, Bruce *et al.* 2014). Papathanassoglou, Karanikola, Kalafati, Giannakopoulou, Lemonidou and Albarran (2012) state that nurses in intensive care units are found to make one care decision every 30 seconds, and approximately nine important patient-care decisions per hour. They said that this suggests that decision-making and exercising judgment is a core nursing activity and that this will impact on the quality of care provided. Participants felt that nurses working in intensive care need to have adequate knowledge and competencies. Moleki (2008); Hadjibalassi, Papastavrou, Lambrinou, Tsangari, Athini, Georgiou, Nicolaou and Merkouris (2012) identified nursing competencies as combining knowledge, skills and attitudes. Nursing competencies are of two kinds with 'formal' competency described as competencies from the speciality training received and 'real' competency defined as the ability to apply knowledge in order to interpret a clinical situation and to choose the appropriate course of action (Botha, 2012). Applied competence describes three components; foundational competence where the nurse understands what she/he knows, practical competencies where the nurse can consider the correct action from several choices, and finally the integration of both of these in a process called reflexive competence (Morolong and Chabeli, 2005).

Gardner, Hase, Gardner, Dunn and Carryer (2008) use the concept of capability to describe the attributes of a nurse beyond taught competencies. Capable people are seen to be able to

move from the familiar to the unfamiliar, learning and adapting and using their skills and competencies as needed in interpreting and managing a new unforeseen situation. Different learning experiences are required to develop a capable person (Hase and Davis, 1999). Watson (2008) supports this by suggesting that training prepares competency skills for anticipated circumstances whereas education provides capability skills for the unanticipated.

All nursing in South Africa falls under the regulating body, the South African Nursing Council which puts regulations into place to control all nursing activities including the teaching of nursing students. The Minister of National Health is guided by SANC recommendations in regard to legislation. This has been put into place as seen in section 45 (1) of the Nursing Act, 1978 (Act No 50 of 1978). SANC regulations relating to the attainment of an additional qualification are, No. R 212 as amended by No. R. 74, 1997. Certification as an intensive care nurse falls within section 45 (1) of the Nursing Act, 1978 (Act No.50 of 1978). Objectives of this further training include an understanding of the development of nursing, the position of the nurse within the national health system and the value of clinical application of research. This further training seeks to assist professional and personal growth of the nurse with regards to ethical decision making, moral reasoning, empathy, assertiveness and conflict resolution and communication skills (SANC, 1997).

Nurses who have a certification in critical care nursing perform better than non-certified nurses when tested on speciality knowledge (Hadjibalassi, Papastavrou, Lambrinou *et al.* 2012; Fulbrook, Albarran, Baktoft *et al.* 2012). A study of nurses working in 13 ICUs in South Africa found that there was no significant relationship between experience and knowledge however there was a small but statistically significant difference, between ICU certified nurses and those who did not have specialist training in this field, which showed that ICU certification did improve levels of knowledge (Perrie, Schmollgruber, Bruce *et al.* 2014). The SANC document outlining required competencies for the critical care nurse specialist (adult), refers to expectations within the domains of professional/ethical/ practice, clinical practice, quality of practice, management/leadership and finally research (SANC, 2014). These are comprehensive and particular to the specialist care of the critically ill patient. It is recommended that every critically ill patient within an ICU has access to these competencies (Williams, Schmollgruber and Alberto, 2006).



#### 5.2.3.3 POOR STAFF ATTITUDE

Barriers to the development of the nurse's role in antimicrobial stewardship were seen by both nursing and non-nursing participants to be that of poor attitude. Participants said that some ICU nurses appeared to have a poor attitude to work with a disregard for universally accepted safe infection control practices and for the antimicrobial stewardship initiative. Nursing and non-nursing participants said that some ICU nurses appeared to show inadequate attention to detail by poor documentation and disorganized filing of important laboratory results. Participants said that this has consequences with regard to the prompt treatment of an infection. Nursing participants suggested that some ICU nurses may think that knowledge about antimicrobial therapy is not relevant to them. Both nursing and non-nursing participants felt that personality was the most important determinant for a proactive nurse. A non-nursing participant suggested that it is difficult to interview for ICU nursing staff.

Participants were concerned that nurses working in intensive care did not behave professionally. Participants also stated that there were occasions where the nurse seemed have a poor attitude and appeared to be doing just the basic work required. Participants discussed incidences where nurses caring for a patient showed a lack of interest in what they were doing (Wynd, 2003; Emeghebo, 2012). Observation of others and their behaviour in clinical practice appeared to be a strong influence on the attitude of nurses. People differ in their perceptions of success and self attainment in their chosen career. Emeghebo (2012) suggested that self-image may be affected by the perception that others may view them in a poor light. Disinterest and poor attitude may also be linked to the stresses of working in a difficult environment and may be related to burnout. There is high bed occupancy and patient turnover in the private healthcare sector in South Africa and this, exacerbated by the shortage of appropriately trained nursing workforce, adds to the workload of nurses (Botma, Botha and Nel, 2011).

Van der Colff and Rothmann (2009) found that registered nurses experienced the following stressors; insufficient personnel to handle the workload, fellow workers not doing their jobs and poorly motivated co-workers. Of all the stressors, staff shortage was rated as the most severe. Moola, Ehlers, and Hattingh (2008) identified the main factors contributing to stress in the intensive care as the shortage of knowledgeable nurses, absenteeism, doctors' demands, lack of support from management and from colleagues, and the stress caused by temporary nurses acquired from nursing agencies. 'A culture of low expectations has

evolved in many hospitals: everyone on the team comes to *expect* and *accept* impossible workloads, poor interdisciplinary collaboration, ineffective communication, and treatment errors' (Dracup and Bryan-Brown, 2006:537).

Participants identified the lack of 'attention to detail' of some nurses in the ICU as a barrier to the development of the nurse's role in antimicrobial stewardship. The lack of ability or will to take the initiative, poor organizational ability in documentation and filing and poor communication skills was perceived to lead to difficulties in receiving timely information regarding important antibiograms and critical adjustment of antimicrobial therapy. In all cases the participants were referring to the 'floor nurse' allocated to the bedside clinical care of a patient in the ICU. The 'floor nurse' allocated to a particular patient in this unit could be a registered nurse or an enrolled nurse with the allocation decision made by the previous shift leader according to staff availability and perceived patient acuity.

Some of the nursing participants gave the impression that there was a lack of self-direction. A nursing participant suggested that some ICU nurses, mainly junior nurses, regarded knowledge about antibiotics as over and above what was expected of them with their nursing duties. Interprofessional learning can result from interactions between members of different professions (Kvarnstrom, 2008), however some nursing participants appeared to expect doctors to teach them during the short periods that the doctors are at the patient's bedside. Requests for explanations at ward rounds is important to clarify decision-making however to expect teaching at this time is unlikely to be successful, and reinforces the perception that some doctors may have that nurses are passive recipients of knowledge and lack self-direction in equipping themselves with the necessary tools for working in an intensive care environment. Disinterest may be linked with a sense of loss of autonomy. Papathanassoglou, Karanikola, Kalafati *et al.* (2012) found that intensive care nurses rated their sense of autonomy with these statements, "I am responsible for my decisions concerning nursing care", "I am responsible for developing my knowledge base" and "I am responsible for developing my nursing skills". ICUs need to be supportive workplaces with innovative leadership that encourages the development of workers (Danielson and Berntsson, 2007).

A study by Schluter, Seaton and Chaboyer (2011), aimed towards understanding nursing work patterns within a changing working environment, found that nurses were working below their level of expertise and many activities could be carried out by lesser skilled nursing staff or support staff. Activities that required no judgement or critical thinking and

consumed much of the registered nurses' time were; running medications between departments, restocking the medication cupboard, cleaning, moving beds, making refreshments for patients, answering phones and other clerical work. Recommendations made by the participants included optimizing the working environment of the ICU in order to provide an environment that supported the development of confidence and the development of good attitude. Standards for a healthy work environment in critical care include authentic leadership, appropriate staffing, true collaboration, effective decision-making, skilled communication and meaningful recognition (American Association of Critical Care Nurses, 2005).

Participants suggested that it was important to ensure the appointment of suitable nursing staff and the active acknowledgement, support and retention of good staff by acknowledgement of the value of experience. The greatest asset of any organisation is its people and opportunities have to be created in order to develop this asset (Richards, 2007). Nurses in the private healthcare sector in South Africa felt that career development was a problem (Pillay, 2009). The successful retention of nurses, and improving patient outcomes, in certain hospitals in America (despite a shortage in the 1980s) was described as a phenomenon named 'magnetism'. The essentials of a 'Magnet hospital' are seen to be a working environment which shows the following; improving RN staffing, moving to a more educated nurse workforce, and improving the care environment (Aiken, Clarke, Sloane, Lake and Cheney, 2008). Kramer and Schmalenberg (2008) added important features of a 'Magnet hospital' as; working with clinically competent nurses, effective team relationships, autonomous decision making, nurse management support of clinical nurses, appropriate staffing of clinical areas and a culture which prioritized the patient.

There is concern about nursing not being chosen as a career by young people. The average age of nurses has been found to be rising, with 63.7% of the nursing population found to be above the age of 40 years (George, Quinlan and Reardon, 2009). A report by the Human Sciences Research Council (HSRC) of South Africa found that nurses below the age of 25 make up only 1.3% of the nursing workforce and that the majority of this age group is entering nursing at an enrolled and auxiliary level (Wildschut and Mqolozana, 2008). Poor working conditions, poor salaries and poor career paths contribute to a negative perception of nursing. The view of nursing as a respected and attractive choice of profession must change in order to recruit future nurses into the profession (Wynd, 2003). Both nursing and non-

nursing participants suggested that it was important to employ the right kind of people to work in an area like an ICU. This reference was made not only to the type of professional qualification that the nurse had but also to the nurse's personality. Van der Colff and Rothmann (2009) suggest that the personality of nurses who manage well in the intensive care arena may be linked to resilience. Certain personality traits such as openness, agreeableness and conscientiousness are linked to self-coping strategies (Burgess, Irvine and Wallymahmed, 2010) and may enable the ICU nurse to engage with others successfully.

#### 5.2.3.4 COLLABORATION BARRIERS

Participants felt that ineffective teamwork was a barrier to the development of the ICU nurse's role within the antimicrobial stewardship team. Nursing participants suggested that they were excluded from decision-making process involving the management of infections. Nearly all nursing participants expressed concern about the perceived dismissive attitude of doctors when interacting with ICU nurses with one nursing participant identifying a person's personality as a factor in a doctor's behaviour. Both nursing and non-nursing participants said that it was important for the ICU nurse to behave diplomatically when dealing with a doctor. Nursing and non-nursing participants said that they were concerned about the lack of experienced nurses working in the ICU with particular reference to the lack of the ICU trained nurse. Non-nursing participants referred to the use of enrolled nurses within the ICU. This was felt to have an adverse effect on doctor expectations and interactions. Non-nursing participants were concerned by the passive behaviour of some ICU nurses with one non-nursing participant referring to some ICU nurses as playing a mechanical role. Several non-nursing participants showed frustration when discussing various aspects of nursing practice by using words such as '*switch on*', '*a 2 year old's question*' and '*think, just think*'.

Some of the collaborative problems within this antimicrobial team appeared to relate to staffing issues. Non-nursing participants appeared to lack confidence in the nurses caring for their patients in the ICU. Nurses caring for the critically ill patient are seen to have responsibilities beyond those expected of registered nurses working outside of the ICU. Within the private healthcare sector in South Africa, the nurse is the only member of the ICU team who is with the patient at all times. Intensive care units within the private healthcare sector in South Africa are almost entirely conducted as 'open' units with individual medical specialists who admit their patients to the ICUs for monitoring and administration of treatment (Hodgson, 2014). Nurses working in these units care for these patients on a high

nurse/patient ratio and are expected to report directly to the patients' doctors who are not based in the unit but visit the patient once or twice a day. Should the condition of a patient deteriorate, the nurse allocated to that patient is expected to have the clinical and cognitive expertise to identify the change in the patient's condition, to assess the extent and significance of the problem, to intervene to maintain haemostasis, to notify the relevant doctor of interim interventions and to carry out any instructions.

Specialist knowledge, competencies and skills are expected by doctors of the nurses employed to work in ICUs. Nurses working in intensive care and who have not been exposed to formal training in this speciality may not have the required competencies to care for the critically ill patient (Scribante and Bhagwanjee, 2007). 'When physicians were rating the degree of interdisciplinary collaboration on a unit, many volunteered that their perception of lack of nurses' competence was the major factor behind lower ratings and a major barrier to collegial nurse-physician relationships' (Schmalenberg and Kramer, 2009:82). Several non-nursing participants expressed their concern regarding enrolled nurses working in ICU. Their expectations were that if a nurse was employed to work in an ICU then that nurse should have the competences, knowledge and skills to provide the specialist care required in order to nurses critically ill patients effectively. ICUs can be very busy clinical areas and nurses working in this environment need to be equipped with a wide range of professional and clinical skills in order to meet the needs of the patients (Kleinpell, 2013). These participants felt that enrolled nurses did not have the skills or requisite knowledge to work in a complex environment such as an ICU and were not able to identify and interpret situations which were critical for the management of the sick patient.

A sense of frustration was shown by the choice of language used by both nursing and non-nursing participants with regard to the attitude and performance of nurses working in ICU. A nursing participant expressed concern of the lack of interest and ability of some nurses *'if you still don't have that, you know, that attention to detail and commitment, then it's a bit far gone!'* Non-nursing participants used the terms *'mechanical'* and *'switch on a bit'* and *'think, think, think'* to refer to a nurse who only assumes a passive role. Reference was made by both nursing and non-nursing participants to their perception that personality plays an important part in professional behaviour and clinical practice

Nursing participants found discussion of antimicrobial treatment with the doctors to be generally difficult and requiring diplomacy. Dickson and Flynn (2012) found four main areas that were important in managing the difficult work environment in ICU; coping with interruptions and distractions, interpreting doctors' orders, documenting near misses and encouraging open communication between disciplines. Rose (2011), states that the ICU is a challenging and stressful work environment where healthcare professionals are faced daily with complicated interprofessional team dynamics. Sheehan, Robertson and Ormond (2007), state that effective teamwork is an indicator of a healthy work environment but challenges arising from working together with other healthcare professionals remain an important issue for intensive care nurses (Williams, Bost, Chaboyer *et al.* (2012).

Antimicrobial stewardship in critical care requires a strong team to address the challenges of bacterial resistance. Antimicrobial stewardship is built on a foundation of evidence-based care and should be seen to be neither doctor work, nor nurse work, but patient work (Goeschel, 2011). Teamwork does not always come naturally to doctors who historically have functioned as autonomous practitioners (Leonard, Graham and Bonacum, 2004). Each discipline has strong traditions and theoretical frameworks which are specific to that discipline (D'Amour, Ferrada-Videla, Rodriguez and Beaulieu, 2005). Le Blanc, Schaufeli, Salanova, Llorens and Nap (2010) suggest that many healthcare workplaces do not promote workplace organisational socialisation amongst healthcare professionals, and that disciplinary socialisation that occurs pre-employment remains the default behaviour. These entrenched patterns of behaviour impact on interdisciplinary collaboration. The terms multidisciplinary and interdisciplinary appear to be used interchangeably in some of the literature. The term multidisciplinary refers to a group of people from different disciplines who care for the same patients but do not necessarily interact, whereas the term interdisciplinary means that interactions between different disciplines takes place during the process of managing the patient (Atwal and Caldwell, 2006). Le Blanc, Schaufeli and Salanova (2010) define team interaction as open communication and offer the term 'synergy' as working together at problem solving. Consideration of the basic understandings of symbolic interactionism, are that a person's behaviour should be seen in the context of a particular environment. Behaviour is seen as a dynamic process and changes as a result of interactions with others (Benzies and Allen, 2001).

Nursing participants felt that doctors were often very busy with their practices in this private hospital and that this had an impact on effective communication. Sheehan, Robertson and Ormond (2007) suggest that it is frustrating for a health professional that has previously experienced effective collaboration to be in an environment where this is not happening. A non-nursing participant identified engagement with doctors as part of the nurses' responsibility in antimicrobial stewardship. However, most nursing participants said that doctors in the unit tended not to listen to them. The traditional hierarchical nature of healthcare resulting in doctors, nursing management and then nurses, with higher to lower perceived and actual levels of status, has created a situation where doctors who are accustomed to giving orders may feel threatened or annoyed by a team approach to care (Goeschel, 2011). Interprofessional collaboration is fundamental to information flow and the coordination of patient care but may be hindered by vertical management structures (Martin, Ummenhofer, Manser and Spirig, 2010). 'Those groups whose social position gives them weapons and powers are best able to enforce their rules' (Dennis and Martin, 2005:199). Bodole (2009) found in a study into nurse/physician communication that nurses felt that they were subordinate to doctors and that this affected their ability to participate in decision making. One of the limitations identified was not including physicians when examining these issues.

Nursing participants appeared concerned about doctor/nurse interactions. Symbolic interactionism explains that any type of social interaction has an impact on subsequent behaviour (Benzies and Allen, 2001). Nurses remain unvalued and unacknowledged and hierarchical decision-making by doctors does not allow nurses to be part of this process. This has implications for team decision-making and affects development of interprofessional collaboration in intensive care (Coombs and Ersser, 2004). Three barriers that prevent effective teamwork are differing views of what teamwork means, varying skills and perceived medical domination (Atwal and Caldwell, 2006). The collaborative relationship and the effect that poor communication had on teamwork, was identified as problematic by most nursing and non-nursing participants. Communication may be affected by the feelings that nurses have regarding their perceived lower professional status in the team (Kleinpell, 2005; Traynor, Boland and Buus, 2010). Persons of a lower status are less likely to speak up about areas of concern (Chaboyer, Chamberlain, Hewson-Conroy, Grealy, Elderkin, Brittin, McCutcheon, Longbottom and Thalib, 2013). A study of nurses working in 29 different intensive care units suggested that psychological wellbeing is linked to self efficacy. This is

defined as the beliefs in one's ability to plan, organise and attain the course of actions that are required to reach a goal. High levels of self efficacy, was found to result in a strong affective bond with team members which led 'ICU nurses to 'invest' in the future quality of working relationships within the team' (Le Blanc, Schaufeli and Salanova, 2010).

Communication difficulties between disciplines resulting in errors, recorded that 37% of these errors were associated with verbal exchanges between the doctors and nurses (Donchin, Gopher, Olin, Badihi, Biesky, Sprung, Pizov and Cotev, 2003). Communication failure was shown to be a causal factor in over 70% of 2455 sentinel events (Leonard, Graham and Bonacum, 2004). There is a shared doctor/nurse responsibility to be vigilant (Jutel and Menkes, 2010). 'Failures of communication, considered examples of poor collaboration among team members, are the leading cause of inadvertent harm across all healthcare settings' (Rose, 2011:5). Nursing and non-nursing participants were concerned about inappropriate antimicrobial therapy being prescribed at times to patients in the unit. This concern included broad spectrum antibiotics being used unnecessarily and prolonged duration of treatment. Castledine (2006) suggests that nurses are key to minimizing the occurrence of medication errors. Research into medication errors found that 32% of prescriptions were for antibiotics and that these prescriptions had the highest incidence of errors (Lewis, Dornan, Taylor, Tully, Wass and Ashcroft, 2008). Intercepting a verbal or written prescription and discussing this with the doctor and confirming that this is the correct drug based on microbiology results contributes to patient safety (Dickson and Flynn, 2012). Antibiotic errors may result in either direct patient harm (i.e. the wrong choice of antibiotic for an infection) or indirect patient harm (i.e. prolonged unnecessary antibiotic exposure resulting in the emergence of multidrug-resistant bacteria within an ICU) (Kollef and Micek, 2012).

A study of 866 American ICU nurses found that improved nurse-physician communication was predictive of nurse-assessed medication errors (Manojlovich and DeCicco, 2007). Henneman, Gawlinski, Blank, Henneman, Jordan and McKenzie (2010) identified strategies that nurses used to pick up errors, strategies to interrupt errors and strategies to correct errors. Strategies nurses used to *identify* errors were; knowing the patient, knowing the "players," knowing the plan of care, surveillance, knowing policy/procedure, double-checking, using systematic processes, and questioning. Strategies that nurses used to *interrupt* errors were: offering assistance, clarifying and verbally interrupting. Finally strategies nurses used to *correct* errors were: persevering, being physically present, reviewing or confirming the plan



of care, offering options, referencing standards or experts, and involving another nurse or physician. Categories of preventable adverse errors include errors of commission, errors of omission, errors of communication, errors of context, and diagnostic errors (James, 2013).

Fry (2012) questions whether nurses in their role of patient advocacy are able to challenge inappropriate prescribing or prolonged courses of antimicrobials. 'Although most antimicrobials are prescribed by doctors, the majority of these drugs are administered by nurses. In their role as a patient advocate, is it the role of nurses to challenge inappropriate prescribing or prolonged courses of antimicrobials? Are nurses being equipped and trained to undertake this role?' (Fry, 2012:182). A great amount of knowledge needs to be assimilated in order to understand antimicrobial management. The process of correct antimicrobial therapy entails correct identification of the organism, correct choice of antibiotics at the optimal time, administration of the antibiotic through the correct route and stopping the antibiotic when indicated (Drew, 2009). Nurses need both to have this information and to have the professional, communicative and diplomatic skills to allow relevant discussion when there is a valid concern about treatment (Dickson and Flynn, 2012).

Discussions with doctors regarding treatment choices were reported by nurse participants as difficult although these participants appeared to persist in trying to clarify the issues that were of concern to them. This may contribute to the development of open discourse in the future. Nursing advocacy requires 'active engagement to inform and direct decisions, it takes moral courage and confidence to assert a viewpoint' (Coombs, 2006:5). Goeschel (2011) suggests that the tensions that appear during the implementation of a project may be an indication that change is occurring and that these tensions occur at points where the most effective learning is taking place. 'The caricature of the subservient white-capped nurse passively 'taking orders' is flawed and misleading. Taking orders often involves discussion, interpretation, clarification and sometimes correction: all areas of potential influence' (Jutel and Menkes, 2010:93). Nursing knowledge of antimicrobial stewardship guidelines is vital in building confidence in the nursing members of the antimicrobial stewardship team. Doctors place their 'professional authority and autonomy over policies and protocols, while nurses use these written guidelines to assert power and demonstrate resistance' (Manias and Street, 2000). The use of protocols in ICU is a way of ensuring evidence-based practice but a sound knowledge base is necessary to use these appropriately (Perrie, 2006; Perrie, Schmollgruber, Bruce *et al.* 2014).

Local guidelines from the Federation of Infectious Diseases Societies of Southern Africa (2012) and *Best Care, Always!* (2011) and international guidelines from the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America (Dellit, Owens, McGowan *et al.* 2007) and the Centre for Disease Control (2013) should be used by nurses as a basis for discussion about appropriate treatment and facilitating collaboration within the team. Wasserman, Boyles and Mendelson (2014) have compiled a pocket guide to antibiotic prescribing on behalf of the South African Antibiotic Stewardship Programme (SAASP), which has recently been distributed for use in hospitals across the country. Evidence-based recommendations are easy to follow and this may be one of the reasons why nurse participants working in this ICU are reporting that they are questioning some of the decisions made by doctors.

Mutual understanding of how the different health disciplines function is vital to collaborative efforts. The roles that nurses hold within the team and their scope of decision-making within this programme should be communicated to other members of the team. Understanding the roles of others is necessary in order to work effectively in a team, particularly a multidisciplinary team (Atwal and Caldwell, 2006; Bodole, 2009). The responsibilities of intensive care nurses sometimes fall in a 'gray area' (Thorsteinsdottir, 2005). Vivian, Marais, McLaughlin, Falkenstein and Argent (2009), described how trust amongst team members in an ICU was improved with the mutual recognition of professional attitudes and practices and this had a positive impact on communication. Kleinpell (2013) notes the functions of doctors and nurses as inherently different in their approach to healthcare. The doctor acquires knowledge about the health situation, evaluates this knowledge and uses this information for a possible solution to the problem. The nurse has the responsibility of establishing and maintaining an extensive therapeutic environment and assisting the patient to become receptive to that environment.

The autonomy of a doctor to prescribe should be challenged if the prescription is thought to be inappropriate (Brink, Coetzee, Clay *et al.* 2010). Weiss and Wunderink (2013), and Weiss, DiBardino, Rho, Sung, Collander and Wunderink (2013), found that compliance was low when using checklists to prompt correct prescribing choices but discussion at 'point of care' or 'real time prompting' was associated with a four-fold increase in behaviour change. These findings were however of 'physician to physician' prompting. Clinicians often practice in an autonomous manner in the private healthcare sector in South Africa and may not

discuss treatment choices with other clinicians or healthcare workers such as nurses (Hodgson, 2014). Therefore 'face to face' real time prompting may be difficult to implement in an environment such as a private ICU. Physicians stated that it was important that nurses not only provided relevant information about the patient but offered potential solutions. Nurses in the same study said that they tended to stay in the background because this avoided conflict (Propp, Apker, Ford, Wallace, Serbenski and Hofmeister, 2010). Nurses who have been trained and have only worked in the private healthcare sector in South Africa, and who have not been exposed to state teaching hospital academic practices, may not be accustomed to regular teaching rounds where it is daily practice that clinical decisions are examined and interrogated. In a study exploring nurses' perceptions of multidisciplinary teams working in acute health care, Atwal and Caldwell (2006) found that the qualities of assertiveness and confidence were thought to be an essential factor in working successfully with other team members. Nurses lack 'assertiveness skills when communicating their unique contribution to patient care requirements when interacting with physicians' (Nelson, King and Brodine, 2008:39).

The understanding of power and how this works within a social construct such as nursing practice is fundamental to the understanding of empowerment (Bradbury-Jones, Sambrook and Irvine, 2008). Using one's judgement or critical thinking is an essential part of the registered nurses scope of practice (Schluter, Seaton and Chaboyer, 2011) however power within the nursing context, is hierarchical and is associated with authority (Kuokkanen and Leino-Kilpi 2000). Nurses may therefore be comfortable with assuming a submissive, non confrontational position when interacting with someone that they perceive to be in a more important position than themselves. The way a nurse behaves when interacting with doctors may contribute to a power imbalance. Nurses need to be aware of this and assume responsibility for the way they present themselves (Nelson, King, and Brodine, 2008). Despina (2009), defines power within collaborative relationships as the ability to influence a situation. Jutel and Menkes (2010:101), refer to Stein's (1968) seminal '*The Doctor Nurse Game*' in which nurses have historically influenced treatment decision-making without appearing to do so. 'The nurse is to be bold, have initiative, and be responsible for making significant recommendations, while at the same time she must appear passive'. Knowledge supports the development of confidence and contributes to nurse autonomy (Skar, 2009). Nurses interviewed in a South African study into nurse/physician collaboration said that knowledge empowered them with confidence and assertiveness (Bodole, 2009).

Antimicrobial stewardship rounds may provide an opportunity to minimize power differentials and allow the ICU nurse a safe environment in which to contribute proactively. Team leaders who welcome the input of members of the team create an environment that provides psychological safety. This is described as having confidence in risk taking such as voicing an opinion (Despins, 2009), and contributes towards the creation of a flat hierarchy within the team which empowers all members of the team, irrespective of status and disciplinary background, to communicate openly and effectively (Michell, 2011). Teams that have grown and developed together are in a position to voice relevant concerns and ask critical questions (Brindley, 2014). Symbolic interactionism suggests that a person learns to “see” the world from interacting with other people and because of this develops shared meaning of situations, people and themselves through a process of interpretation. Thus, members of a team are viewed as saying and doing things because they have learned to “see” things in a particular way’ (Sheehan, Robertson, and Ormond, 2007:20).

#### 5.2.3.5 WORKING IN ISOLATION

Barriers resulting in isolation were identified by both nursing and non-nursing participants who suggested that there was inadequate communication and feedback about antimicrobial stewardship activities. Nursing participants said that doctors did not support the weekly teleconference antimicrobial stewardship meeting. Nursing participants also felt that pharmacists did not provide the support that they felt they required. In addition to the perceived isolation of nursing participants by doctors and pharmacists not participating in the antimicrobial stewardship programme, non-nursing participants appeared to suggest that there was also isolation of hospital pharmacists by doctors not involving these healthcare workers in the decision-making process.

Nursing participants reported that they had limited involvement within the antimicrobial stewardship programme. They did not attend the weekly teleconference meeting, they did not receive feedback from the various aspects of the initiative and they did not participate in the decision-making process with doctors. Contributions from both nursing and non-nursing participants suggest a lack of cohesion within the antimicrobial stewardship team. Nursing management started this programme soon after the hospital opened in view of the current concerns within healthcare regarding bacterial resistance. Doctors managing patients within this ICU were invited to attend weekly antimicrobial stewardship meetings with nursing management, in order to discuss patients and any issues. Telecommunication was arranged

with the microbiologists from the private laboratory that helped to set up the programme. Pharmacists were also invited to attend these meetings. Drew (2009) suggests that effective implementation of an antimicrobial stewardship programme should have an infectious disease physician and a clinical pharmacist with infectious disease training as core members of the team. Doron and Davidson (2011) state that it is not always possible to have an ideal antimicrobial stewardship team and that implementation of a stewardship programme should not be delayed because of the lack of availability of personnel.

The dynamics of private healthcare may increase the perceptions of working alone. A model of nurse/physician collaboration by Baggs and Schmitt (1997), suggests that collaboration can only be effective if the healthcare workers are physically in the same place. The other requisite identified for working together in a team was being receptive which was defined as having interest, questioning, respect, trust and open listening and required being physically together in the same place when communication took place. Most healthcare delivery takes place with team members at various locations which affects both how often the team is able to meet and the quality of any interactions (Zwarenstein and Reeves, 2002; Propp, Apker, Ford *et al.* 2010).

Nursing participants were concerned that doctors may not understand what the nurses are trying to do with the implementation of the antimicrobial stewardship programme. They were concerned that doctors did not participate actively in the programme and did not attend the arranged weekly teleconference meeting with the microbiologist. Some non-nursing participants said that they were not able to participate in meetings because consulting practices kept them very busy in the hospital and a Friday morning meeting was difficult to attend. Some non-nursing participants said that they were not included in communications regarding developments in the hospital. Other non-nursing participants said that they were not aware of this scheduled meeting and would value feedback about the stewardship programme.

The problems with getting ‘buy-in’ from doctors might be because this is a primarily a nurse-led programme and there has been inadequate communication with stakeholders. Physicians will not alter their antimicrobial management practices unless they are aware of and are in agreement with proposed initiatives (Srinivasan, Song, Richards, Sinkowitz-Cochran, Cardo and Rand, 2004). There needs to be widespread support of an initiative such as this with an

acknowledgement that resistant pathogens affects patient outcome, has an effect on the immediate ICU environment with resultant knock-on effects on the wider hospital environment and community and also has a reputational effect on the hospital as noted by one of the nursing participants. Policies and protocols are a powerful nursing resource to provide guidance in uncertain situations (Manias and Street, 2000) but a team approach is needed to both design and implement protocols otherwise they are likely to be unsuccessful (Fessler and Brower, 2005). Protocols and guidelines assist common understanding and the promotion of effective healthcare through the clarification of goals and work processes and the responsibilities of the various health care workers (Kangasniemi, Vaismoradi, Jasper *et al.* 2013).

A non-nursing participant was unsure about the value of the contributions of the infection-control nursing coordinator in the study hospital. Another non-nursing participant did not know that there was such a person and expressed concern that the hospital was not communicating this information. Nursing participants said that they were concerned that some doctors did not adhere to accepted health industry infection prevention practices. Hierarchical structures and perceived different levels of status may contribute to the feelings that it may seem rude for a nurse to point out to someone, who is perceived to be on a higher level, that adherence to aseptic procedures have not been followed. Infection control and antimicrobial stewardship are two strategies that have to be implemented together in order to prevent antimicrobial resistance (DiazGranados, 2012). The aseptic insertion of invasive lines was identified by participants as important in the prevention of infection although nursing participants said that at times some clinicians showed poor compliance with this. Recommendations for optimal insertion of these lines are that hand washing is carried out in preparation for the procedure in an aseptic manner, maximal barrier precautions are used by the doctor, the skin is cleaned with chlorhexidine and alcohol skin and the procedure is conducted in a sterile manner with daily assessment for necessity with prompt removal if not required (Gillespie, 2008; Perovic, 2011).

In South Africa promotion of infection control within health care settings has been widely promoted by the '*Best Care, Always*' campaign (Whitelaw, 2015) and it is unlikely that healthcare professionals have not been exposed to the principles of prevention of transmission of infection. Over 200 hospitals in the private healthcare sector in South Africa have seen a reduction in the rate of HAI since the introduction of infection monitoring

(Kantor, 2014). The successful implementation of catheter bundles with a significant decrease in central line infections under the '*Best Care, Always*' initiative, has been seen in these hospitals (Brink, Coetzee, Clay *et al.* 2010). Respect for institutional aims is mandatory within teamwork (Amalberti, Auroy, Berwick and Barach, 2005). Not doing what one knows to be the correct thing to do, not only compromises patients' safety and flouts universal healthcare practices, but shows a disregard for the endeavours of colleagues in the work place. 'Failure of doctors or nurses to follow safe practices (hand hygiene, time outs, etc.) is a manifestation of lack of respect (for experts, authority, institutional aims) and is clearly hazardous' (Leapfrog Group, 2014). There has been interest in whether failure to observe safe practice such as hand washing should be regarded as non-compliance or as an adverse event (McInnes, Phillips, Middleton and Gould, 2014).

Nursing and non-nursing participants suggested that it was important that nurses should know more about the various antibiotics that they are giving and stressed that the effectiveness of an antibiotic depended on it being mixed correctly and the time period over which it was given. Nursing participants said that they would like the pharmacist to attend antimicrobial meetings and to provide floor nurses with informational support about various antibiotics and the practical aspects of antimicrobial administration. Some nursing participants were concerned that ICU nurses do not understand the importance of giving antibiotics at correctly spaced time intervals. Nurses often ask each other for advice regarding the mixing and administration of an intravenous medication rather than an expert source. Medication errors can occur at several points; at transcription, dispensing or administration (Dickson and Flynn, 2012). Pharmacists are not directly involved in the preparation or administration of intravenous medications, and may not know the mixing and administration problems that nurses encounter at the bedside and that advice may be needed (Taxis and Barber, 2003).

Concern was raised by nursing participants with regard to the volume of antibiotic mixture left behind in the intravenous giving set. Incomplete administration of the antibiotic dose may lead to treatment failure (Farrer, 2011). Under dosing may also occur from incorrect information on how to give an antibiotic. Antibiotic packaging information sheets may be inaccurate and need updating. Meropenem, a carbapenem mentioned frequently by participants and used widely in South African intensive care units, is a time-dependent antibiotic (Ampath Infectious Diseases Peer Group, 2014). The administration of time-dependent antibiotic differs from the administration of concentration-dependent antibiotics

and resistance may therefore be caused by under dosing (Cotta, Roberts, Tabah, Lipman, Vogelaers and Blot, 2014; Blot, 2015). Guidelines by the Ampath Infectious Diseases Peer Group (2014) suggest that each dose of meropenem is best given over a 3 hour period, however current package inserts provided by the manufacturing company, AstraZeneca, still state that the dose may be administered over 15 to 30 minutes.

A non-nursing participant said that the lack of involvement in the antimicrobial stewardship programme by the pharmacy department was because there was no clinical pharmacist employed in the study hospital. No formulary restrictions were in place in the hospital and pharmacists did not approach doctors to discuss antibiotic treatment. The presence of a clinical pharmacist has been shown to provide valuable input with regard to the length of course of antimicrobial therapy (Bronkhurst and Pretorius, 2014) however most non-nursing participants did not see the pharmacist as playing a useful role. A study into the attitudes of pharmacists and physicians with regard to antibiotic policies in hospitals, found that surgeons and paediatricians were the least likely of the specialities to have a positive attitude to these policies and this was thought to be because they did not use medications as much as other specialities. Physicians and pharmacists were found to be positive with regard to antimicrobial stewardship interventions such as rational use of antibiotics and improving the quality of antibiotic prescribing in teaching hospitals, but this differed in non-teaching hospitals where physicians were found to be less positive (Adu, Simpson and Armour, 1999).

Careful use of antibiotics includes proactive measures. Antimicrobial stewardship programmes are based primarily on education along with a ‘front end’ approach such as formulary restriction or antimicrobial cycling, or a ‘back end’ approach such as de-escalating empirical therapy on the basis of cultures and the patient’s clinical condition to targeted therapy as indicated by antibiograms (Paterson, 2006; Cotta, Roberts, Tabah *et al.* 2014). No participants mentioned the former aspect of antibiotic control. This may be for several different reasons. This stewardship program was nurse-initiated and the pharmacist was reported to be absent from the team. More importantly, it may be difficult to impose such restrictions upon clinicians practicing within hospitals in the private healthcare sector in South Africa.

Non-nursing participants showed an awareness of autonomous practice within the private healthcare sector. South African microbiologists, Brink, Feldman, Richards *et al.* (2008),



suggest that autonomous prescribing practice should be challenged. This is supported by Charani, Cooke and Alison (2010). Brink, Botha, van den Ende *et al.* (2003) and MacDougall and Polk (2005) state that the scheduled rotation of antimicrobials used in a hospital or unit reduces resistance by changing selective pressure which impacts on the emergence of resistant pathogens and should be included as part of a stewardship programme. However Majumdar and Padiglione (2012) suggest that ‘cycling’ needs to be researched more thoroughly before recommending it as part of antimicrobial stewardship. Katsios, Burry, Nelson *et al.* (2012) however state that education and face-to-face clinical decision support can change prescriber culture and that an antimicrobial stewardship programme does not need to include formulary restriction which may be perceived to restrict autonomous practice. Pagani and Harbarth (2012), suggest that social norms, cultures, the need for autonomy in the clinical decision-making process, professional relationships, medical hierarchy and attitudes on antimicrobial prescribing all have an influence on prescribing behaviour. They note that there is increasing awareness of the role of behaviour change strategies to affect antibiotic prescribing in critical care. Ohl and Luther (2014) suggest that exposure to antimicrobial stewardship should be included early on in the education of all healthcare professionals and should include the core principles of diagnosis and management of infection, how to prescribe appropriately and most importantly, coaching to improve communication skills.

#### 5.2.3.6 ECONOMIC BARRIERS

Participants referred to three different types of economic pressures which may act as barriers to the development of the role of the nurse within antimicrobial stewardship; firstly economic pressures relating to private healthcare in which an ICU is run as an open unit due to autonomy dynamics of doctors within this healthcare sector; secondly, economic pressures relating to this hospital were staffing constraints for both ICU nurses and pharmacists resulting in insufficient time in which to carry out nursing in-service training in ICU, untrained and unqualified nurses looking after critically ill patients, and challenges with regard to pharmacist participation and support of the antimicrobial stewardship initiative. Thirdly, there were economic pressures relating to the expectations of medical aid organisations with regard to the use of generic pharmaceutical products.

Growth of the private healthcare sector in South Africa has increased over the past decade in part to the movement of public health resources to primary healthcare (Pretorius and Klopper, 2012). The development of hospitals by private healthcare companies has increased rapidly

over the past 2 decades with the private healthcare sector accounting for over half (4.4%) of 8.6% South Africa's GDP health expenditure and the public state sector, which provides for the majority (84%) of the country's population, accounting for 4.2% (Naidoo, Singh and Lalloo, 2013). There is an estimated 259 private hospitals providing healthcare services to approximately 7.8 million (20%) of the South African middle and high income population who are in a position to afford medical insurance, medical scheme membership and out-of-pocket expenditure (Hospital Association of South Africa, 2009).

The administration of private hospitals in South Africa differs from that of government hospitals in that they are managed by shareholders and healthcare companies and rely heavily on medical insurance and medical scheme membership for economic viability, whereas the government hospitals are managed by the Department of Health and are funded by public funds (Thom, 2008). There is a strong 'doctor centric' approach where the medical specialist is seen as central to the economic viability of the private hospital (Pretorius and Kloppe, 2012). The growing trend of hospitals within the private healthcare sector in South Africa to run intensive care units as 'open' structures may be due to the need to attract and retain medical specialists. Investment in infrastructure, technology and workforce are 'in large determined by the demands of medical practitioners the private hospitals seek to attract' (Matsebula and Willie, 2007). 'Open' intensive care units in the private healthcare sector are not managed by intensivists but by independent specialists with autonomous practice (de Beer, Brysiewicz and Bhengu, 2011). The success of healthcare depends on how well the members work together as a team (Edwards, Drumright, Kiernan *et al.* 2011) and a major criticism of the 'open' intensive care phenomena is that this results in several specialists serving one patient, with often poor collaboration, overlapping orders and potential adverse events from missed problems. This is an aspect of practice in the private healthcare sector in South Africa that flows from the daily time constraints of private healthcare specialists and means that multidisciplinary 'ward' rounds in ICU's are not common practice (Hodgson, 2014).

Several non-nursing participants identified the value of a doctor who would act as a decision maker in the intensive care unit and coordinate care (Perovic, 2011). The intensive care unit under study is managed by the hospital as an 'open' unit. 'Closed' intensive care units, where the critically ill patient is managed by a team of healthcare professionals led by a dedicated specialist intensivist, should be the standard of care however only one percent of intensive

care units in the private healthcare sector in South Africa meet this requirement (Michell, 2011). This is a decrease in numbers from an earlier audit of national critical care resources by Bhagwanjee, Scribante, and the Council of the Critical Care Society of Southern Africa (2008) which found that four percent of private ICUs were ‘closed’ units. Quality initiatives recommended by the USA healthcare users representative group, Leapfrog Group, endorses four proactive initiatives, one of which is that ‘staffing intensive care units with intensivists has been shown to reduce the risk of death by 40%’ (Leapfrog Group, 2014). These initiatives or ‘leaps’ as they are called, adhere to certain criteria; there must be scientific evidence to support the intervention, the intervention is feasible in the short term, the intervention will benefit health consumers and finally the presence or absence of these interventions are easily noted by healthcare insurers and consumers. The critical care specialist was created by the College of Medicine of South Africa in 1999 (Mathivha, 2002). The presence of intensivists reduces morbidity and mortality (Scribante and Bhagwanjee, 2007), reduces the rate of VAP (Richards, 2005) and reduces sepsis in an ICU (Perovic, 2011). There are 16 trained intensivists in KwaZulu-Natal, however only two are in the private healthcare sector and both are practicing as anaesthesiologists as the ‘open’ unit infrastructure within private healthcare has not supported use of them as intensivists (Hodgson, 2014).

The coordination of patient care in an intensive care is carried out by charge leaders and intensivists (Lundgrén-Laine, Kontio, Kauko, Korvenranta, Forsström and Salanterä, 2013). In absence of an intensivist, the dynamics of private healthcare ‘open’ intensive care units means that a large responsibility rests on the nursing staff to organise direct patient care and allocate nursing resources. First-line managers, responsible for the co-ordination of nursing care within their unit, found difficulty in problem-solving issues beyond those of the organisation of nursing practice (Suominen, Savikko, Puukka, Doran, and Leino-Kilpi, 2005). The hospital structure should support a learning environment. ‘A health care organization must have a “learning gene” and the shared assumption that learning is a good thing, worth the investment’ (Moleki, 2008).

Nursing participants appeared to view the shift leaders’ rounds and the weekly teleconference meeting as the main part of the antimicrobial stewardship programme. However, shift leaders did not seem to attend these telecommunication meetings. This may have been due to staffing and time constraints however this may have contributed to poor information flow regarding

current antimicrobial stewardship decisions. Nursing participants were concerned that there was insufficient time to carry out in-service training. This is contrary to the principles of professional nursing practice where it is expected that requisite knowledge, skills and competencies are maintained by an individual and supported by the healthcare organisation (Fulbrook, Albarran, Baktoft *et al.* 2012). Every staff member brings unique characteristics in work and life experiences and unique learning and development needs (McIntosh, 2008). It can be very difficult in ICUs where unpredictable patient loads can challenge optimal staffing of the unit. Time constraints within a busy unit would therefore affect additional duties such as stewardship (Edwards, Drumright, Kiernan *et al.* 2011).

Non-nursing participants suggested that nurses should not be ‘poached’ from state health and that it was important that the study hospital commit itself to training nurses in order to improve the quality of patient care. The Human Sciences Research Council (HSRC) of South Africa found the public /private split with regards to employment of nurses was 60% within the public healthcare sector in comparison to 40% in the private healthcare sector despite meeting the needs of only 20% of the population (Wildschut and Mqolozana, 2008). The private sector registered the training of 3374 pupil nurses and 4256 pupil auxiliaries in 2006, although the majority of training produced the lower categories of nurses. Private sector contribution was noted to be 65% of total training with 35% of training by state nursing colleges and 5% by universities (Wildschut and Mqolozana, 2008). An examination into the contribution of the private healthcare sector to the economy in South Africa shows a commitment by the three main private hospital groups, Netcare, Life Healthcare and Mediclinic, to supporting nursing training within the private healthcare sector with Netcare (SA) supporting 3,294 nurses and Life Healthcare 1,250 nurses in training. It is not stated whether this training produced enrolled or registered nurses. Records by Mediclinic reflect 35,320 structured learning interventions (ECONEX Trade, Competition & Applied Economics, 2013).

Both nursing and non-nursing participants commented throughout the interviews on the use of inexperienced and unqualified nurses in this ICU, with non-nursing participants particularly concerned about the competencies and skills of enrolled nurses with regards to nursing the critically ill patient. The position statement issued by the World Federation of Critical Care Nurses (2005) states that all critically ill patients should have access to a registered nurse with a post registration critical care nursing qualification (Fulbrook,

Albarran, Baktoft *et al.* 2012). Although international recommendations and guidelines are that nurses working within the intensive care environment have an ICU certification, Botha (2012) states that within South Africa this is not a requirement by SANC. This may present healthcare providers with a conundrum; on the one hand nurses working within the intensive care environment are required to have competencies particular to this specialised area, however it is not a legal requirement to employ nurses with an intensive care certification (Botha, 2012). Critically ill patients have the right to be cared for by suitably trained nurses (Williams, Schmollgruber and Alberto, 2006).

As hospitals are increasingly managed from a business perspective, nursing practice has had to change (Needleman, Bauerhaus, Stewart, Zelvinsky and Mattke, 2006). This may be compounded by the ‘doctor centric’ approach within the private healthcare sector in South Africa, leaving nursing issues undervalued and unsupported by hospital management (Pretorius and Klopper, 2012). Cost reduction staffing initiatives such as the increased use of lesser trained nursing staff, are associated with lapses in infection control (Richards, 2005). Guidelines on the management of nosocomial infections estimate that one in seven patients is at risk of a hospital- acquired infection in a South African hospital (Brink, Feldman, Duse *et al.* 2006; Kindness and Brysiewicz, 2010). Healthcare-associated infections are estimated to occur in about 9% of hospital admissions. Nearly 45% of all these nosocomial infections occur in ICU patients although they only occupy 8% of hospital beds (Loudon, 2012). This increases healthcare costs considerably and has been a challenge in healthcare in South Africa (Kantor, 2014). ‘In the current era, 21% of patients entering the ICU have an infectious disease as their primary reason for admission and 10% of initially non-infected patients will develop an infection after 24 hours of intensive care. The rate of infection for patients in intensive care for more than 7 days may be as high as 70%. At any point in time, 51% of ICU patients are considered to be infected and 71% are receiving antibiotics. Thus, preventing and managing infections is part of the everyday challenge for all critical care professionals’ (Decker and Masur, 2015:1153).

Organisational factors have been shown to be linked to the risk of hospital-acquired infections (O’Halloran, 2008). Inadequate staffing combined with inexperienced nurses and an increased workload can lead to unsafe practice and adverse events (de Beer, Brysiewicz and Bhengu, 2011). ‘The average ICU patient has been estimated to receive 178 interactions with providers daily’ (Decker and Masur, 2015:1153). Nurses responsible for the care of the

critically ill patient therefore have to pay great attention to infection control. Surgical mortality rates were 60% higher in hospitals which were staffed with less educated nurses (Aiken, Clarke, Sloane *et al.* 2008). A strong association has been made linking a reduction in registered nurse staffing with poor patient outcomes (Hugonnet, Chevreton and Pittet, 2007; Kutney-Lee, Lake and Aiken, 2009) with the rate of infection in ICU affected by the reduction of nurse to patient ratios (Perovic, 2011).

A nursing participant said that infections that occur during a hospital stay could result in a reputational cost to the hospital. Cunha, Varughese, and Mylonakis (2013) suggest that the costs of therapeutic failure, consequent re-treatment and the economic burden of microbial resistance are high. The misuse of antimicrobial medicines and poor infection control practices encourages the spread of antimicrobial resistance (FIDSSA, 2012; WHO, 2013). The private hospital sector in South Africa has seen the first cases of multi-resistant *Klebsiella pneumonia* (Brink, Coetzee, Clay, Sithole, Richards, Poirel and Nordmann, 2012), and not much later, pan-resistant *Klebsiella pneumonia* (Brink, Coetzee, Corcoran, Clay, Hari-Makkan, Jacobson, Richards, Feldman, Nutt, van Greune, Deetlefs, Swart, Devenish, Poirel and Nordmann, 2013).

The issue of staffing in this acute care area should be addressed despite the economic concerns of running a hospital in the highly competitive and pressured private health care sector. In recent years there has been a change in staffing profile with the increased use of lesser trained staff such as enrolled nurses and the use of agency nurses when there is a shortage of staff in ICUs. This raises concerns with regards to competencies and patient safety (Matlakala, 2012). In order to achieve good patient outcomes it is necessary to invest in a strong nursing workforce. Williams, Schmollgruber and Alberto (2006) suggested that complications such as nosocomial infections and medication errors were associated with a reduction in the number of registered nurses providing direct patient care. Errors occur as a consequence of different layers of health systems failure, not only at the individual level, and problems at several layers may all contribute to the adverse event (Miller and Chaboyer, 2006). This was recognised many years ago by Leape, Brennan, Laird, Lawthers, Localio, Barnes, Hebert, Newhouse, Weiler and Hiatt (1991) who stated that causes of adverse events need to be examined closely for systems failure which was considered by Leape and his colleagues to be entirely preventable. Therefore, accountability for errors lies not only with the individual but also with the organisation and this should include examination of the

circumstances leading to the error and future prevention of these circumstances. This organizational responsibility relates to comprehensive patient safety initiatives including preventive, investigative and remedial measures (Kangasniemi, Vaismoradi, Jasper, *et al.* 2013).

Nursing participants raised the difficulties regarding access to the expertise of a pharmacist and said that they needed to discuss antibiotic choices and clarify mixing and administration of medication queries. A non-nursing participant voiced the concerns that have arisen as a result of not employing a clinical pharmacist and stated that at present only dispensing pharmacists are employed by the hospital and that they are stretched and cannot provide support to antimicrobial stewardship. Kantor (2011), when reporting on the ‘*Best Care, Always*’ campaign in South Africa, noted that clinical pharmacologists in seven hospitals in the private health care sector actively audit antimicrobial use with clinical microbiologists which results in ongoing intervention and feedback within these hospitals.

There appeared to be disagreement between non-nursing participants with regard to the appropriateness of using generic antimicrobial therapy in this intensive care unit. Generic antibiotics were perceived by most participants to be inferior pharmaceutical products (Alanis, 2005; Vesga, Agudelo, Salazar, Rodriguez and Zuluaga, 2010; Gauzit and Lakdhari, 2012). Participants stated that only original antibiotics were used in this ICU and that generic antibiotics were returned if dispensed from the pharmacy. A non-nursing participant felt that generic antibiotics could be used in critically ill patients and said that there was a misunderstanding about the poor efficacy of these drugs. Within South Africa, the Medicines & Related Substances Control Amendment Act no 90 of 1997 has regulated the use of generic drugs and pharmacists may offer generics to all patients unless the substitution is more expensive. The patient or doctor may refuse this in which case the original drug will be dispensed (Deroukakis, 2007). Some non-nursing participants stated that original antimicrobial agents are more expensive than generics (Finch, 2010) and that medical aid companies were concerned that this was driving up the cost of caring for ICU patients. Participants reported the knowledge of the use of multiple antibiotics by some prescribers. This may contribute to increased medical costs in these patients. Approximately 80% of antibiotic prescriptions are generic antibiotics which tend to be cheaper than proprietary compounds making this an attractive choice however widespread use is seen as contributing to bacterial resistance (Finch, 2010).

There is concern that the growing use of generic antimicrobial therapy may be contributing to microbial resistance. In a study into the efficacy of vancomycin, all generics proved equivalent in vitro but all failed in vivo (Vesga, Agudelo, Salazar *et al.* 2010). Non-nursing participants reported that there appears to be pressure from medical aid companies to use generic antimicrobials in order to reduce costs but were concerned that these drugs may not provide optimal treatment for their critically ill patients. Gauzit and Lakdhari (2012) suggest that generic antibiotic drugs may not have the therapeutic equivalence of the branded drugs and that there are no or minimal requirements for bioequivalence studies of generic intravenous drugs before they can be marketed. One important aspect of a bioequivalence study is the comparison of the blood concentration of the active ingredient in the generic drug with that of the original, from the point that it enters the body to the point that it is eliminated from the body. ‘There are differences at all levels: drug components, levels of impurity, pharmacokinetics, pharmacokinetic/ pharmacodynamic relationship, in vitro effectiveness, therapeutic effectiveness in experimental models, etc. So that finally, the specifications approved in the initial submission file of brand name drugs are not always respected by a generic drug’ (Gauzit and Lakdhari, 2012;141).

The private healthcare industry in South Africa is under pressure to keep health GDP expenditure down with the National Health Insurance (NHI) model planned shortly for implementation in South Africa. Private doctors contracted into the NHI will need to show effective interventions within particular healthcare areas (Motsoaledi, 2013). Discovery Health, one of the largest medical insurance companies in South Africa has been a driving force in supporting ‘*Best Care, Always*’, a nationwide infection control drive, within the private hospital sector in South Africa in order to reduce hospital-acquired infections (Kantor, 2011). This has been highly successful with Netcare hospital group, the largest private hospital company in South Africa with 9000 beds and the highest percentage of ICUs within the private hospital groups, with 43 of the hospitals within the Netcare group active participants in the ‘*Best Care, Always*’ campaign (van den Bergh, Devenish and Swart, 2015).

In the 2008 to 2009 period, 75% of the 4 719 ICU/HC beds in South Africa were found to be in the private healthcare sector (Naidoo, Singh and Lalloo, 2013). There is a large responsibility for proper management of patients within these units and even more so with regard to the growing challenges of bacterial resistance. No participants in this study, nursing



or non-nursing, mentioned a current initiative taken by doctors in KwaZulu-Natal in response to the green paper on the NHI scheme proposed by the Department of Health in South Africa. A group of doctors in KwaZulu-Natal calling themselves ‘the KwaZulu-Natal specialist network’, representing approximately 300 doctors in practice from different hospitals in the private sector, have chosen to work together with the intention of improving private healthcare with one of the aims of this group to meet to discuss best management of antibiotic usage within the healthcare sector (KZN Specialist Network, 2014).

### 5.3 SYMBOLIC INTERACTIONISM

This study has been conducted from a qualitative viewpoint with symbolic interactionism used as the underpinning theory to assist the researcher in understanding the role of the ICU nurse in the antimicrobial stewardship team. Burbank and Martin (2009) describe the basis of symbolic interactionism as identified by Blumer (1969) as a person’s behaviour, towards someone (or a group of people), is based on the meanings that this person has for them. These meanings arise out of the social interaction that one has with others and are modified through an interpretative process used by the person in dealing with these interactions.

#### 5.3.1 SYMBOLIC INTERACTIONISM AND ROLE DEVELOPMENT

Symbolic interactionism is concerned with the meanings that interactions with others have for the individual person. Professional role development is made possible by examining the effects of dominant ideology on knowledge development, understanding the reference group and defining a particular situation (Burbank and Martins, 2009). Joel (2004) refers to the process of role development as following three main steps; belonging to a reference group, the socialization into this group and identification of a particular role within this group. The construction of practice identities is deeply affected by the importance that others attribute to these roles. Power relationships are examined by Dennis and Martin (2005) who suggest that understanding of power imbalances can be obtained by examining face-to-face interactions; the ‘micro’ aspects of social life. A person’s perspective of a social situation results from engagement in that situation. That person’s interpretation of that situation is real and meaningful to that person and is that person’s truth.

#### 5.3.2 SYMBOLIC INTERACTIONISM AND TEAMWORK

In this chapter it is seen that teamwork is a difficult process. Burbank and Martins (2009) support Blumer’s theories (1969) when they suggest that the actions of others, and the ways

that others act towards a person, help to define the meanings that a situation holds for that person. They discuss Kuhn (1972) who named these significant others as ‘orientational others’ and described them as those who provide an individual with meaningful roles. Benzie and Allen (2001) suggest that in order to understand behaviour in a particular situation, it is necessary to know how that behaviour developed and how individuals perceive the consequences of various kinds of behaviour. People are thinking beings and give meaning to events and situations (Burbank and Martins, 2009). Each discipline has a strong foundation of behaviour and expectations of the members of that discipline therefore collaboration means examining this foundation with a view to sharing responsibilities (D’Amour, Ferrada-Videla, Rodriguez *et al.* 2005). A person’s working life has constant interactions with others, one of which is collaboration with a particular reference group. Interaction with a reference group affects an individual’s perspective and assists in defining the particular situation which leads the individual to act in a particular manner. The effects of this behaviour is then interpreted and results in a changed perspective and definition of the situation which has an effect on future behaviour (Charon, 2007).

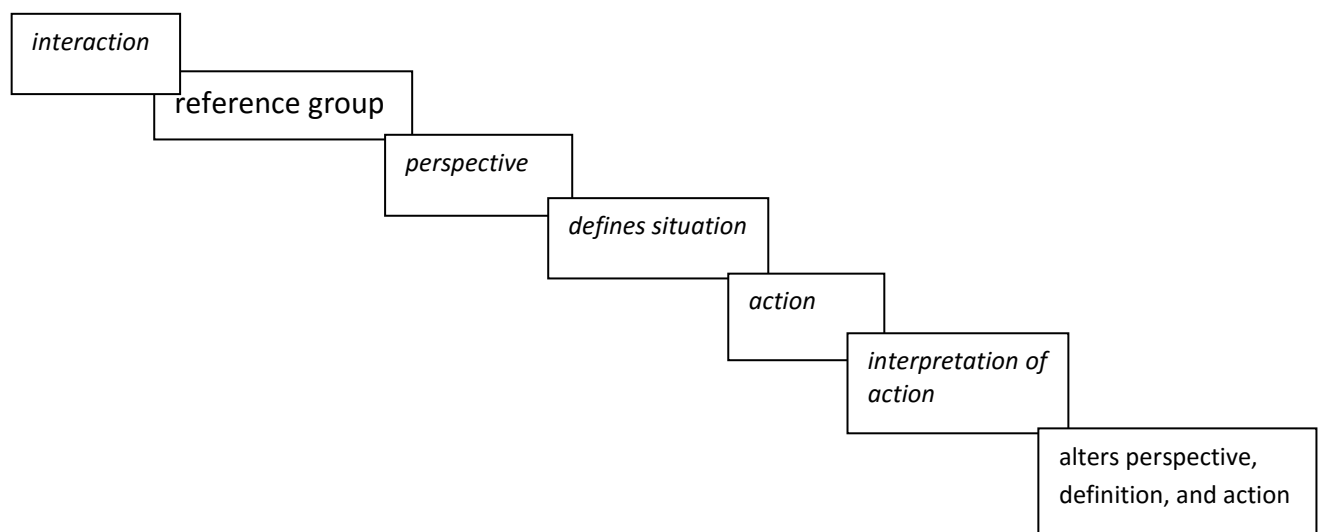


Fig. 5.1 Symbolic Interaction Process  
(Burbank and Martins, 2009)

### 5.3.3 CRITICISM OF SYMBOLIC INTERACTIONISM

Symbolic interactionism has been criticised by Burbank and Martins (2009) for explaining interactions and behaviour at the ‘micro’ or individual level. They state that healthcare issues are complicated and use the ‘upstream’ and ‘downstream’ analogy to discuss this. An ‘upstream’ approach to an issue is generally at a macro level and focuses on the cause of a

problem. A ‘downstream’ approach to an issue is at the micro level and focuses on the problem itself. Burbank and Martins (2009) suggest that critical perspective, which has traditionally been seen as divergent to symbolic interactionism, should be combined with symbolic interactionism to address structural problems rather than only looking at the level of the individual nurse. By using a more pragmatic approach and combining these two theoretical perspectives, nurses can develop more insight into role development and collaborative problems at the individual level while at the same time identifying those factors at the macro level which contribute to these issues.

#### 5.4 SUMMARY OF CHAPTER

This chapter discusses the contributions of the multidisciplinary participants and examines their perceptions of the role of the intensive care nurse within the antimicrobial stewardship program in the study hospital. The relevance of symbolic interactionism to the role of the nurse is discussed.

## **CHAPTER SIX: SUMMARY, LIMITATIONS AND RECOMMENDATIONS**

### **6.1 INTRODUCTION**

Personal reflections of the researcher are presented in this chapter along with a brief summary of the study and its limitations. The results of this study have been considered and recommendations have been made for clinical nursing practice and policy development, for nursing research and possible studies to further involve the nurse in antimicrobial stewardship in critical care. Recommendations are made for nursing education and the preparation of both general and intensive care nurses for changing healthcare conditions. Finally, recommendations for the educational role of the Critical Care Society in South Africa for CPD policy development at national level are discussed.

### **6.2 RESEARCHER REFLECTIONS**

The researcher is a registered nurse and was employed as a clinical nurse to care for critically ill patients in the adult general intensive care unit when this hospital was first opened as a small private hospital. An antimicrobial stewardship programme was started within a few months and the researcher was interested to observe the development of this initiative. The researcher holds a position of floor nurse which involves the daily care of patients and includes the monitoring of infective markers, the administration of antibiotics/antifungals and interaction with the various healthcare disciplinary members involved in the care of patients in this unit. The researcher is not involved in the organisation of the antimicrobial stewardship programme in this intensive care unit.

The design of the research project posed several difficulties. Gathering data regarding the role of the intensive care nurse in this antimicrobial stewardship team meant examining not only what nurses in the team felt about this role but also how the other members of the team perceived this role. The team members were from a wide range of healthcare professionals from different disciplines. Setting up interviews was difficult as most of the participants had clinical commitments. Clinical nurses had to be interviewed whilst on duty as they found it difficult to make time for this when off duty. Permission was granted by management to extend the lunch hour period so that the nurse participants could participate in the study. Interviews were booked with the secretarial staff of the non-nursing participants who found it difficult to find time for this between ward rounds, theatre responsibilities and emergency interventions and most of these interviews were granted and conducted with very little notice.

Interviewing colleagues was interesting but daunting at times. As a novice researcher, it was not easy to interview people that one works with on a daily basis and occasionally the interviews became a discussion of issues. However participants seemed interested in the study and appeared to enjoy the interviews. The close work relationship that the researcher has with the participants may have contributed both to the frank contributions and to a belief that the study will have a positive benefit on the hospital. As the interviews progressed the researcher turned to current literature on the different issues raised by the participants and these were then developed in subsequent interviews in order to explore them as fully as possible. Symbolic interactionism had been chosen as the theoretical framework for this study and it was interesting to see how group behaviour and interaction was perceived by the different healthcare disciplines.

### 6.3 SUMMARY OF STUDY

A rationale for the study is presented followed by a brief review of literature, methodology and discussion of results.

#### 6.3.1 RATIONALE FOR THE STUDY

Antimicrobial stewardship has become an important part of healthcare around the world especially within the critical care setting. With increasing antimicrobial resistance fewer antibiotics are proving to be effective and it is becoming more difficult to manage infections in the very ill patient. This has resulted in increased severity of illnesses with prolonged ICU stays and increased mortality, and has implications for increased healthcare costs. The ICU nurse is known to be an integral part of the general ICU multidisciplinary team due to the particular nature of nursing the critically ill patient. With antimicrobial stewardship now part of established healthcare interventions in the intensive care arena, this study has sought to explore what role the ICU nurse can play within the antimicrobial stewardship team.

#### 6.3.2 LITERATURE REVIEW

Overuse of antibiotics in the community in humans and in the management of livestock (Spellberg, Powers, Brass *et al.* 2004), and misuse of broad-spectrum antibiotics within the hospital setting has led to highly resistant pathogens with international organisations pronouncing this a public health threat (World Health Organisation, 2014). The current move of the pharmaceutical industry away from the production of antimicrobials to chronic medications has compounded the problem of the dwindling number of effective antibiotics

and antifungals (Jacob and Gaynes, 2010). Government organisations, infectious disease societies and critical care societies across the world have compiled web-based recommendations and guidelines for healthcare practitioners (Dellit, Owens, McGowan *et al.* 2007; Best Care Always, 2011; Centre for Disease Control, 2013). The very sick patient is vulnerable to infection and measures need to be taken to protect this patient group, in particular, from poor choices of antimicrobial therapy which may lead to resistant bacteria (Deege and Paterson, 2011). Antimicrobial stewardship is an important part of the care of the critically ill patient and includes measures to ensure that antimicrobial therapy is prescribed appropriately and that adequate infection control is carried out to prevent microbial resistance (Best Care Always, 2011).

Antimicrobial stewardship requires a team approach and a review of current literature identified clinicians, pharmacists, microbiologists and infectious disease specialists as the healthcare disciplines that are seen as important to these programmes. Kollef and Micek (2012) identify the multidisciplinary antimicrobial stewardship team as being made up of intensivists, infectious disease specialists, microbiologists, and pharmacists. Grunwald, Zervos, Zervos and Brar (2014) see this team as including an infectious diseases physician, a clinical pharmacist with infectious diseases training, infection control professionals, a hospital epidemiologist, a clinical microbiologist and an information specialist. The literature has mainly identified the nurse as playing an important part in infection control (Ziady, 2012) however there was very little literature on the role of the ICU nurse within antimicrobial stewardship and Edwards, Drumright, Kiernan *et al.* (2011) suggest that this aspect of antimicrobial stewardship has not been adequately explored.

### 6.3.3 METHODOLOGY

The purpose of this study was to determine the role of the ICU nurse within an antimicrobial stewardship programme. Members of the multidisciplinary antimicrobial stewardship team in a general adult ICU in the private healthcare sector in South Africa were asked to participate in this study. Qualitative methodology was chosen to examine how these various disciplines viewed the role that the ICU nurse played within this team. Semi-structured interviews were chosen to allow flexibility within the interview process and core questions were used as a basis to facilitate discussion of the topic. Participants were from two main groups; nursing and non-nursing. Nursing participants included clinical nurses in ICU and nursing management. Non-nursing participants included specialists from the disciplines of

microbiology, pharmacy, surgery, internal medicine and anaesthesiology. Data collection took place during August 2014 with interviews being conducted over a period of three weeks. Fifteen participants took part in the study with interviews lasting an average of 20 to 30 minutes. Content analysis was used to identify categories, subcategories and sub subcategories from the data. Main categories that arose from the data were the extensive role expected of the ICU nurse in antimicrobial stewardship, how participants felt that this role can be developed, and perceived barriers to the development of this role.

#### 6.3.4 OVERVIEW OF FINDINGS

Objective 1: To explore the perceptions of members of the interdisciplinary antimicrobial stewardship team of the role of the intensive care nurse in the daily working of the antimicrobial stewardship programme in this general intensive care unit. The ICU nurse was seen by participants as an important part of the antimicrobial stewardship team with specific aspects of the role identified as; firstly, organisational with regard to patient documentation which was monitored by shift leaders and contributed to unit records and laboratory surveillance data; secondly, advocacy with regard to inappropriate antimicrobial therapy and bacterial resistance; thirdly, clinical with regard to monitoring changes in the condition of the ill patient in order to identify early signs of infection, administering antimicrobial treatment, ensuring that infection control is properly carried out in the unit in order to minimize hospital-acquired infections, cross infection and environmental resistance; and lastly, collaborative with regards to communication of all the above to the various members of the multidisciplinary antimicrobial stewardship team during ward rounds and at other times.

Objective 2: To explore the perceptions of members of the interdisciplinary antimicrobial stewardship team with regard to the contributions of the different members of this team to antimicrobial stewardship in this general intensive care unit with particular reference to the role of the intensive care nurse. Nursing management started the stewardship programme in the ICU soon after the study hospital had been opened, provided guidance to nurses in ICU with regard to infection control measures and introduced antimicrobial stewardship shift rounds. Microbiologists from one of the private laboratories were instrumental in providing guidance and support for the antimicrobial stewardship programme, and individually to doctors, and participated actively in the weekly telecommunication antimicrobial stewardship meetings. Pharmacists did not play a role within the antimicrobial stewardship team, did not

attend antimicrobial stewardship meetings, were not approached for help by ICU nurses and were not part of the decision-making process with doctors. Doctors prescribed antimicrobial treatment for the individual patients under their care in ICU. They occasionally referred to microbiologists for advice. They did not include nurses in the decision-making process.

Objective 3: To explore communication patterns within the interdisciplinary antimicrobial stewardship team in this general intensive care unit with particular reference to the role of the intensive care nurse. Doctors reviewed antimicrobial treatment at the bedside of their particular patient and gave instructions to the floor nurse allocated to care for that patient for the day.

Objective 4: To explore perceived barriers to communication in the interdisciplinary antimicrobial stewardship team in this general intensive care unit with particular reference to the role of the intensive care nurse. Barriers to communication were perceived as inadequate educational preparation and poor professional behaviour of the ICU nurse. Some non-nursing participants felt that communication was difficult with under qualified nurses such as enrolled nurses. Doctors and pharmacists and shift leaders did not attend the weekly antimicrobial stewardship meetings. Doctors communicated individually with the microbiologist but did not contact the pharmacist in order to discuss treatment.

Objective 5: To explore the collaborative role of the intensive care nurse in the interdisciplinary antimicrobial stewardship team in this general intensive care unit. Nurse/doctor collaboration was perceived as poor by nearly all participants. This was attributed to poor communication about antimicrobial stewardship activities, poor nurse knowledge and dismissive doctor behaviour. Ineffective collaboration may have contributed to misunderstandings, miscommunication and frustration and may provide an obstacle to the development of the role of the nurse within the antimicrobial stewardship team.

Objective 6: To explore perceived barriers to developing the role of the intensive care nurse in the interdisciplinary antimicrobial stewardship team in this general intensive care unit. Multifactorial barriers to the development of the role of the ICU nurse within the antimicrobial stewardship team were identified as; resource barriers with the lack of experienced nurses and ICU trained nurses available to work in this specialised area; knowledge and competency deficits due to poor basic nursing training and inadequate



opportunities for in-service education; poor nursing attitudes with poor attention to detail; collaboration barriers due to nurse perceptions of dismissive doctor behaviour and doctor perceptions of inexperienced and under qualified nurses, working in isolation without adequate support from doctors and pharmacists and finally, economic barriers due to the pressures of opening a new hospital within the private healthcare sector and expectations of medical aids to keep costs down.

#### 6.4 LIMITATIONS TO STUDY

This study has limited generalizability due to a single setting being used. This study setting is in the private healthcare sector in one of the eleven provinces in South Africa, and only involved one hospital. Limitations of this study may also be that this study was conducted in a new hospital that is independent of the three main private healthcare sector hospital groups in South Africa, each of which have standardised healthcare policies for their respective hospital groups. The ICU in the study hospital had no established policy for antimicrobial stewardship and this had to be researched and the programme built up. Therefore these findings are contextual, are specific to the study hospital and cannot be generalized. The researcher works in this ICU and this may have affected the interview process however the researcher found that participants appeared relaxed and communicative. The questions posed to the participants were known by the researcher to be important and relevant. Participants from different disciplines offered useful information from their varying perspectives. The researcher believes that the researcher is part of this qualitative research study and accepts that there may be some subjectivity in data-analysis as the study subject is known to the researcher; however every attempt has been made to establish academic rigour and maintain truthfulness to minimize bias.

#### 6.5 RECOMMENDATIONS

Recommendations have been made with regard to the development of the role of the ICU nurse in antimicrobial stewardship with consideration to addressing barriers to the development of this role as highlighted by participants in this study. Nursing research is important to clarify how intensive care nurses can contribute to worldwide and local antimicrobial stewardship and to determine how nurses may be contributing to microbial resistance.

### 6.5.1 RECOMMENDATIONS TO ADDRESSING RESOURCE BARRIERS

Resource barriers were identified by participants as a lack of time in which teaching and learning could take place within the ICU, a lack of experienced nurses available to work in the ICU and a shortage of ICU trained nurses in the country.

#### 6.5.1.1 RECOMMENDATIONS FOR OPTIMAL STAFFING IN ICU

Hospital and nursing management should ensure that appropriately trained nursing staff are placed in specialised areas such as the intensive care area, with sufficient registered nurses available to provide supervision and guidance to enrolled nurses with regard to both general nursing care and antimicrobial stewardship concepts and duties. Allocation of nurses to individual patients within the intensive care should be carried out with consideration to patient acuity and needs. Every provision should be made by hospital and nursing management to provide an environment which ensures patient safety. Poor nursing staffing should be acknowledged by hospital and nursing management as a major contributing factor to hospital-acquired infections and microbial resistance.

#### 6.5.1.2 POSITIVE PRACTICE ENVIRONMENTS

ICUs need to be supportive workplaces with innovative leadership that encourages the development of workers. Continued research is required in this area with particular regard to conditions in ICUs in South Africa. Studies need to be conducted with regard to the best way to staff these specialised units in view of the reduced pool of ICU trained nurses in South Africa and creating training opportunities in view of time constraints in a busy ICU.

### 6.5.2 RECOMMENDATIONS TO ADDRESSING KNOWLEDGE BARRIERS

Implications for nursing practice are the development of good clinical practice in ICU nurses that minimizes antimicrobial resistance in critically ill patients and in the ICU by in-service training, annual performance review, development of clinical policies and the development of teamwork. All ICUs should have an antimicrobial stewardship programme in place and all ICU nurses caring for the critically ill should participate in this initiative. Clinical support can be delivered by clinical nurse facilitators who are in a position to identify learning needs.

### 6.5.2.1 CLINICAL PRACTICE IN ICU

In order to effectively contribute to the antimicrobial stewardship initiative, ICU nurses need to be able to:

- administer antimicrobial therapy correctly according to pharmaceutical administration guidelines for different antimicrobial/antifungal treatments in order to minimise microbial resistance
- prevent hospital-acquired infection by adhering to universal evidence-based infection control principles for hand washing, care of invasive lines and minimising conditions under which ventilator-associated pneumonia can occur
- monitor the critically ill patient diligently for any changes in the patient's vital signs that may indicate the onset of infection i.e. blood stream infection/VAP
- monitor the condition of invasive lines and when these should be changed/removed
- monitor positive laboratory results that indicate infection
- monitor the duration of antimicrobial therapy and understand the importance of de-escalation of therapy
- effectively communicate changes in the patient's condition to the relevant member of the healthcare team

### 6.5.2.2 IN-SERVICE TRAINING

In-service training should be an on-going part of clinical nursing. Hospital and nursing management need to ensure that time and adequate staffing should be allocated in order to facilitate this. Nursing leadership in intensive care units needs to ensure that nurses are aware of antimicrobial initiatives being carried out in those units and that these form the foundation of an antimicrobial stewardship programme. Because of the high turnover of nursing staff working in ICUs, in-service training should be carried out regularly. Training schedules that address the needs of ICU nurses with regard to awareness, competencies, and skills can be compiled with feedback from nursing staff. ICU nurses caring for the critically ill need to:

- be taught evidence-based infection control procedures such as hand washing, the correct management of invasive lines, and critical interventions to minimise the occurrence of VAP
- be taught how to diligently monitor for signs of infection in their patients by carefully observing wounds, documenting significant changes in vital signs, performing careful chest auscultation, and noting changes in endotracheal secretions

- be aware of the importance of laboratory reports such as infective markers and blood cultures in guiding the antimicrobial treatment of the patient
- be aware of the roles that the other members of the antimicrobial stewardship team play in providing optimal evidence-based care of the patient
- be aware of the worldwide challenges that face healthcare today with bacterial resistance and comprehend that a nurse has a wider responsibility than just the immediate care of patients in the intensive care unit

#### 6.5.2.3 NURSING EDUCATION

The South African Nursing Council (SANC) is well placed to develop nursing policy regarding nursing training in response to healthcare needs within South Africa. Nursing needs to be developed to address changes in the world and ICU training needs to be relevant to current clinical practice with emphasis on optimal infection control practices. Basic nursing education should include teaching about antimicrobial stewardship and nurses' responsibilities within this initiative such as optimal infection control, current public health issues such as bacterial resistance and how the overuse of antibiotics in the community impacts upon patients within hospitals. Intensive care educational curriculums need to be reviewed to ensure that they meet the needs of clinical practice and that they equip future ICU nurses with relevant knowledge, competencies and skills. This should include teaching about environmental resistance and the need for careful consideration of the indication for and choice of antimicrobial therapy in the critically ill patient.

#### 6.5.2.4 CONTINUING PROFESSIONAL DEVELOPMENT

ICU nurses need to ensure that knowledge and competencies are kept up to date in accordance with SANC requirements for continuing professional development. Hospitals should ensure that they fulfil their responsibilities to both nursing staff and patient safety by providing learning opportunities within the hospital environment and supporting other means of providing necessary education. Nursing institutions in South Africa should create appropriate short courses in addition to the provision of certification courses for distance learning in intensive care nursing. There may be a place for the Critical Care Society of South Africa to provide a forum for nursing learning activities. Consideration should be given to the inclusion in the South African Journal of Critical Care (SAJCC) of a nurse directed page for ongoing learning which could result in achieving CPD points. CPD initiatives could be:

- short distance learning courses that contribute to CPD points

- nurses' quizzes in South African online journals that contribute to CPD points
- reading journal articles and answering short questions which contribute to CPD points
- provision of hospital learning opportunities that contribute to CPD points

### 6.5.3 RECOMMENDATIONS TO ADDRESSING PROFESSIONAL BARRIERS

Research needs to be conducted into the career choices that school leavers make and how to support those who enter into the nursing profession. Hospital and nursing management should be aware of the need for ongoing support of professional nurse behaviour and provide opportunities for nurses to be mentored.

#### 6.5.3.1 NURSE ATTITUDES AND POOR PERFORMANCE

Research needs to be carried out into ICU nurse attitudes and poor performance to identify:

- reasons for choosing nursing as a career
- acquisition of professional skills
- attitude towards workload
- attitude towards work seen as 'extra' to daily work commitments
- personal skills needed for working effectively in ICU, i.e. organizational, communicative and collegial.

#### 6.5.3.2 ANNUAL PERFORMANCE REVIEW

Most healthcare institutions have a yearly opportunity for nursing management to meet with each nurse. The annual performance review should be used as an opportunity to consider individualized continuing education programmes for ICU nursing staff. It should encompass in-depth discussion of an ICU nurse's clinical practice and requirements for continuing professional development, with particular reference to antimicrobial stewardship. This should include:

- assessment of nurse adherence to universal infection control principles
- assessment of nurse adherence to evidence-based bundle care
- assessment of nurse administration of antimicrobial/antifungal therapy
- guidance for optimal collegial interactions within an antimicrobial stewardship programme
- planning for opportunities for relevant continuing professional development

#### 6.5.3.3 POLICY DEVELOPMENT

Policies should be available to guide clinical practice. Evidence-based policies should be developed relating to:

- the antimicrobial stewardship programme in the intensive care unit
- shift leader responsibilities within the antimicrobial stewardship programme
- floor nurse responsibilities within the antimicrobial stewardship programme
- guidelines for functioning within the antimicrobial stewardship team with particular emphasis on optimal communication

#### 6.5.3.4 RESEARCH INTO THE ROLE OF THE ICU NURSE IN AS

Further research into the role of the ICU nurse in antimicrobial stewardship and how this role is performed needs to be conducted with regard to other intensive care units in South Africa:

- clinical monitoring for indications of infection
- understanding laboratory findings
- understanding antimicrobial/antifungal choices for different infections
- understanding de-escalation principles from broad to narrow-spectrum antimicrobial therapy
- monitoring of duration of antimicrobial therapy
- correct administration of antimicrobial therapy
- delay in commencement of medication
- correct mixing of medication
- time intervals between doses
- understanding of the link between hand washing and hospital-acquired infections
- optimal use of evidence-based clinical practice to minimise ventilator-associated infections

#### 6.5.4 RECOMMENDATIONS TO ADDRESSING COLLABORATION BARRIERS

Collaboration with other disciplines is important to provide effective care to critically ill patients. Hospital and nursing management need to be aware of the factors that contribute to poor communication. ICU nurses need to be given training in communication and given opportunities to develop confidence in their ability to create positive change. Nursing team building should be supported through meetings and ward rounds. The current curriculum of intensive care nursing does not necessarily provide the personal skills that ICU nurses need, given the role that nurses have played in the past as very junior members of the critical care

health team, such as the development of confidence, assertiveness and communicative skills necessary for team work. Multidisciplinary engagement on issues of communication with other disciplines and understanding of the roles that other disciplines play in antimicrobial stewardship need to be encouraged. Research needs to be carried out to further examine the relationships between ICU nurses and doctors in the critical care setting and how these impact on patient care with regards to nurse/doctor interactions in ICUs in the private healthcare sector, doctor non-compliance with infection control i.e. hand washing and antimicrobial stewardship teamwork.

#### 6.5.5 RECOMMENDATIONS TO ADDRESSING AS SUPPORT BARRIERS

Any new initiative such as this antimicrobial stewardship programme requires a great deal of support from hospital and nursing management as well as the clinical specialists who have patients in the ICU. All stakeholders need to be committed to this and research needs to be conducted into the factors that result in a lack of formal and informal support for the ICU nurse. Pharmacist support in particular should be given, in order to allow the nurse to carry out optimal administration of antimicrobial therapy and thereby minimise opportunities for microbial resistance.

#### 6.5.6 RECOMMENDATIONS TO ADDRESSING ECONOMIC BARRIERS

Studies should be considered in order to determine the economic stressors within the private healthcare sector in South Africa and how these may impact on the provision of safe patient care:

- nursing staffing levels may be affected by a difficult economic period in South Africa
- ‘open ICUs’ may affect collaborative initiatives such as antimicrobial stewardship
- inadequate pharmacist staffing may result in suboptimal antimicrobial/antifungal administration by nurses

#### 6.4 CONCLUSION

This study has established that all disciplines of healthcare workers in ICU understand that the care of the critically ill patient can be complicated by difficult infections and ineffective antibiotics. The value of the ICU nurse in antimicrobial stewardship has been identified as; organizing shift leader AS rounds and AS meetings, diligent monitoring of the ill patient for signs of infection, documenting and communicating these findings to other members of the antimicrobial stewardship team, administering antimicrobial therapy correctly and preventing

hospital-acquired infections. Further findings of the study were that this contribution of intensive care nurses needs to be supported and developed to strengthen antimicrobial stewardship and that this could be carried out by involving all ICU nurses in antimicrobial stewardship programmes in the unit and ensuring that relevant continuing education takes place. The study found that barriers to the ICU nurse's role in antimicrobial stewardship were; inadequate nursing training and knowledge, poor nursing attitudes and lack of attention to detail, poor multidisciplinary teamwork, isolation of the nurse from the support of other healthcare disciplines, and economic pressures.

Recommendations for clinical practice are to involve all nurses working in the ICU, both registered and enrolled nurses, in the antimicrobial stewardship programme, to provide in-service training to both of these categories of nurses and to use the annual performance review with each nurse as an opportunity to assist the self-assessment of knowledge and competencies in order to plan appropriate continuing professional development. Clear guidelines and policies regarding the antimicrobial stewardship programme need to be established. Communication should be identified as an integral part of teamwork and opportunities created for development of this. Further research needs to be carried out into the various aspects of the role of the ICU nurse in antimicrobial stewardship, optimal staffing of ICUs and nurse/doctor collaboration.

Both basic nursing training and ICU specialist training need to reassess curricula with regard to the challenges of bacterial resistance in healthcare organisations and within the community. All nurses should be expected to proactively participate in continuing professional development by the South African Nursing Council. Opportunities for CPD acquisition should be supported by all hospitals, and distance learning in the form of short courses should be considered to meet needs for continuing professional development. The role of organizations such as the Critical Care Society of South Africa can be developed to provide opportunities for CPD points through short quizzes either online or within the published journal, the South African Journal of Critical Care.



## REFERENCES

- AACN. 2005. AACN Standards for establishing and sustaining healthy work environments: A journey to excellence. American Association of Critical Care Nurses, *American Journal of Critical Care*, 14 (3): 187- 197.
- Adu, A., Simpson, J. and Armour, C. 1999. Attitudes of pharmacists and physicians to antibiotic policies in hospitals *Journal of Clinical Pharmacy and Therapeutics*, 24: 181-189.
- Afshari, A., Pagani, L. and Harbarth, S. 2012. Year in review 2011: Critical care - infection. *Critical Care*, 16 (242): 1- 8.
- Aiken, L., Buchan, J., Sochalski, J., Nichols, B. and Powell, M. 2004. Trends in international nurse migration. *Health Affairs*, 23 (3): 69- 77.
- Aiken, L., Clarke, S., Sloane, D., Lake, E. and Cheney, T. 2008. Effects of hospital care environment on patient mortality and nurse outcomes. *Journal of Nursing Administration*, 38 (5): 223- 229.
- Alanis, A. 2005. Resistance to antibiotics: Are we in the post-antibiotic era? *Archives of Medical Research*, 36 (6): 697- 705.
- Amalberti, R., Auroy, Y., Berwick, D. and Barach, P. 2005. Five system barriers to achieving ultrasafe health care. *Annals of Internal Medicine*, 142: 756- 764.
- Ampath Infectious Diseases Peer Group. 2014. Guidelines to antimicrobial therapy and the laboratory diagnosis of infectious diseases. Fourth Edition. South Africa.
- Argent, A. 2009. Critical care in Africa. *South African Journal of Critical Care*, 25 (1): 4- 8.
- Arias, C. and Murray, B. 2009. Antibiotic-resistant bugs in the 21st Century - A clinical super-challenge. *New England Journal of Medicine*, 360 (5): 439- 443.
- Atwal, A. and Caldwell, K. 2006. Nurses' perceptions of multidisciplinary team work in acute health-care. *International Journal of Nursing Practice*, 12: 359- 365.
- Baggs, J. and Schmitt, M. 1997. Nurses' and resident physicians' perceptions of the process of collaboration in an MICU. *Research in Nursing and Health*, 20: 71- 80.
- Benner, P. 1982. From novice to expert. *The American Journal of Nursing*, 82 (3): 402-407.
- Benton, D. 2012. Advocating globally to shape policy and strengthen nursing's influence. *The Online Journal of Nursing of Issues in Nursing*, 17 (1): 1- 8.

Benzies, K. and Allen, M. 2001. Symbolic interactionism as a theoretical perspective for multiple method research. *Journal of Advanced Nursing*, 33 (4): 541- 547.

Best Care, Always! 2011. Antibiotic stewardship in the hospital environment: Getting Started Guide. accessed July, 2013

[www.bestcare.org.za/.../Antibiotic+Stewardship+Getting+Started+Guide+..v1.pdf](http://www.bestcare.org.za/.../Antibiotic+Stewardship+Getting+Started+Guide+..v1.pdf)

Best Care, Always! 2012. The 4 infection prevention Best Care, Always! accessed November, 2014.

[www.bestcare.org.za/.../NEW+VAP+1+pager+for+adults\\_Nov+2012.pdf](http://www.bestcare.org.za/.../NEW+VAP+1+pager+for+adults_Nov+2012.pdf)

Bhagwanjee, S., Scribante, J. and the Council of the Critical Care Society of Southern Africa. 2008. National audit of critical care resources: How long before we act? *South African Journal of Critical Care*, 24 (1): 4- 6.

Bhengu, B. 2012. Role ambiguity and specialisation with impact on OSD and qualifications. ppt. *Advanced Nursing Practice module*. School of Nursing. College of Health Sciences. University of KwaZulu-Natal, South Africa.

Bhengu, B. 2014. CPD for nurses - When is it going to be implemented? *Annual Congress. Critical Care Society of South Africa, 2014*. Cape Town, South Africa.

Blot, S., Poelaert, J. and Kollef, M. 2014. How to avoid microaspiration? A key element for the prevention of ventilator-associated pneumonia in intubated ICU patients. *BioMed Central Infectious Diseases*, 14 (119): 1- 6.

Blot, S. 2015. Antibiotic therapy in ICU: What should nurses know? *Annual Congress Critical Care Society of South Africa, 2015*. Sun City, South Africa.

Bodole, F. 2009. Nurses' perceptions of nurse/physician collaboration in the intensive care units of a public sector hospital in Johannesburg. *Submitted as a dissertation for Masters in Nursing Science*. University of the Witwatersrand, South Africa. accessed August, 2015. [www.google.co.za/#q=Bodole%2C+F.+2009.+Nurses%E2%80%99+perceptions+of+nurse%2Fphysician+collaboration+in+the+intensive+care+units+of+a+public+sector+hospital+in+Johannesburg](http://www.google.co.za/#q=Bodole%2C+F.+2009.+Nurses%E2%80%99+perceptions+of+nurse%2Fphysician+collaboration+in+the+intensive+care+units+of+a+public+sector+hospital+in+Johannesburg)

Botha, L. 2012. Level of nurses' competence in mechanical ventilation in intensive care units of two tertiary health care institutions in Gauteng. *Submitted as a dissertation for Masters in Nursing Science*. University of the Witwatersrand, South Africa. accessed November, 2014. <http://wiredspace.wits.ac.za/jspui/bitstream/10539/13114/1/Nurses%20level%20of%20competence%20in%20mechanical%20ventilation%20PDF.pdf>

- Botma, Y., Botha, H. and Nel, M. 2011. Transformation: are nurse leaders in critical care ready? *Journal of Nursing Management*, 20: 921- 927.
- Bradbury- Jones, C., Sambrook, S. and Irvine, F. 2008. Power and empowerment in nursing: a fourth theoretical approach. *Journal of Advanced Nursing*, 62 (2): 258- 266.
- Brindley, P. 2014. Improving teamwork in anaesthesia and critical care: many lessons still to learn. *British Journal of Anaesthesia*, 112 (3): 399- 401.
- Brink, A., Botha, M., van den Ende, J. and Budavari, S. 2003. Carbapenem resistance - mechanisms and strategies that might impact on resistance. *South African Journal of Critical Care*, 19 (1): 11- 19.
- Brink, A., Feldman, C., Duse, A., Gopalon, D., Grolman, D., Mer, M., Naicker, S., Paget, G., Perovic, O. and Richards, G. 2006. Guideline for the management of nosocomial infections in South Africa. *The South African Journal of Epidemiology and Infection*, 21 (4): 152- 160.
- Brink, A., Moolman, J., Cruz da Silva, M. and Botha, M. 2007. Antimicrobial sensitivity profile of selected bacteraemic pathogens from private institutions in South Africa. *South African Medical Journal*, 97 (4): 273- 279.
- Brink, A., Feldman, C., Richards, G., Moolman, J. and Senekal, M. 2008. Emergence of extensive drug resistance (XDR) among Gram negative bacilli in South Africa looms nearer. *South African Medical Journal*, 98 (8): 586- 592.
- Brink, A., Coetzee, J., Clay, C., Corcoran, C., van Greune, J., Deetlefs, J., Nutt, J., Feldman, C., Richards, G., Nordmann, P. and Poirel, L. 2010. The spread of carbapenem-resistant Enterobacteriaceae in South Africa: Risk factors for acquisition and prevention. *South African Medical Journal*, 102 (7): 1- 3.
- Brink, A., Coetzee, J., Clay, C., Sithole, S., Richards, G., Poirel, L. and Nordmann, P. 2012. Emergence of New Delhi Metallo-Beta-Lactamase (NDM-1) and *Klebsiella pneumoniae* Carbapenemase (KPC-2) in South Africa. *Journal of Clinical Microbiology*, 525-527.
- Brink, A., Coetzee, J., Corcoran, C., Clay, C., Hari-Makkan, D., Jacobson, R., Richards, G., Feldman, C., Nutt, L., van Greune, J., Deetlefs, J., Swart, K., Devenish, L., Poirel, L. and Nordmann, P. 2013. Emergence of OXA-48 and OXA-181 Carbapenemases among *Enterobacteriaceae* in South Africa and evidence of *in vivo* selection of Colistin resistance as a consequence of selective decontamination of the gastrointestinal tract. *Journal of Clinical Microbiology*, 51(1): 369- 372.
- Bronkhurst, E. and Pretorius, J. 2014. The need for pharmaceutical care in an intensive care unit at a teaching hospital in South Africa. *The Southern African Journal of Critical Care*, 30 (2): 41- 44.

Bruijns, S., Green, R. and Wallace, L. 2012. Sepsis as a cause of rising health care casualties in Africa. *African Journal of Emergency Medicine*, 2: 47- 48.

Brysiewicz, P. 2013. *Qualitative lecture notes*. NURS816H2. School of Nursing. College of Health Sciences. University of KwaZulu-Natal, South Africa.

Burbank, P. and Martins, D. 2009. Symbolic interactionism and critical perspective: divergent or synergistic? *Nursing Philosophy*, 11: 25- 41.

Burgess, L., Irvine, F. and Wallymahmed, A. 2010. Personality, stress and coping in intensive care nurses: a descriptive exploratory study. *Nursing in Critical Care*, 15 (3): 129-140.

Burns, N. and Grove, S. 2009. *The Practice of Nursing Research*. Philadelphia: WB Saunders Co.

Carlson, E., Pilhammar, E. and Wann-Hansson, C. 2010. “This is nursing”: Nursing roles as mediated by precepting nurses during clinical practice. *Nurse Education Today*, 30: 763- 767.

Carlton, K., Ryan, M., Ali, N. and Kelsey, B. 2007. Integration of global health concepts in nursing curricula. *Nursing Education Perspectives*, 28 (3): 124- 129.

Cars, O., Diaz Högberg, L., Murray, M., Nordberg, O., Sivaraman, S., Stålsby Lundborg, C., So, A. and Tomson, T. 2008. Meeting the challenge of antibiotic resistance. *British Medical Journal*, 337: 1- 8.

Castledine, G. (2006) Prescribing is not the only issue for nurses and drugs. *British Journal of Nursing*, 15 (15): 837- 837.

Centre for Disease Control. 2013. Core Elements of Hospital Antibiotic Stewardship Programs. accessed August, 2013. <http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html>

Chaboyer, W. 2005. Evidence-based nursing. *9<sup>th</sup> Congress of the World Federation of Societies of Intensive and Critical Care Medicine*. Buenos Aires, Argentina.

Chaboyer, W., Chamberlain, D., Hewson-Conroy, K., Greal, B., Elderkin, T., Brittin, M., McCutcheon, C., Longbottom, P. and Thalib, L. 2013. Australian intensive care units: establishing a baseline for quality improvement. *American Journal of Critical Care*, 22: 93-103.

Chang, S., Sevransky, J. and Martin, G. 2012. Protocols in the management of critical illness. *Critical Care*, 16: 306: 2- 6.

Charani, E., Cooke, J. and Alison, A. 2010. Antibiotic stewardship programmes- what’s missing? *Journal of Antimicrobial Chemotherapy*, 65: 2275- 2277.

Charani, E., Castro-Sánchez, E. and Holmes, A. 2014. The role of behavior change in antimicrobial stewardship. *Infectious Disease Clinics North America*, 28: 169- 175.

Charon, J. 2007. *Symbolic Interactionism: An Introduction, An Interpretation, An Integration*, 9th Edition. Pearson Prentice Hall, NJ.

Chunnillall, D., Peer, A., Naidoo, I. and Essack, S. 2015. An evaluation of antibiotic prescribing patterns in adult intensive care units in a private hospital in KwaZulu-Natal. *South African Journal of Infectious Diseases*, 30 (1): 17- 22.

Cilliers, G. 1991. Human Sciences Research Council Report. The working conditions of professional nurses in intensive care and high care areas in the Republic of South Africa. *The South African Journal of Critical Care*, 7 (1): 4- 6.

Cleghorn, J. 2011. The impact of infection prevention bundles. *The Federation of Infectious Diseases Societies of Southern Africa Conference 2011*. South Africa.

Clouse, R. 2006. Nursing organizations call for phase-out of agricultural practices that promote antibiotic resistance. *Policy, Politics and Nursing Practice*, 7 (1): 17- 22.

Cooke, G., Tanser, F., Barnighausen, T. and Newell, M. 2010. Population uptake of antiretroviral treatment through primary care in rural South Africa. *BioMedical Centre Public Health*, 10:585: 1- 9.

Coombs, M. and Ersser, S. 2004. Medical hegemony in decision-making – a barrier to interdisciplinary working in intensive care? *Journal of Advanced Nursing*, 46 (3): 245- 252.

Coombs, M. 2006. Managing today's reality of delivering critical care nursing. *British Association of Critical Care Nurses, Nursing in Critical Care*, 11 (5): 216- 217.

Cotta, M., Roberts, J., Tabah, A., Lipman, J., Vogelaers, D and Blot, S. 2014. Antimicrobial stewardship of B-lactams in intensive care units. *Expert review of anti-infective therapy*. 12 (5): 581- 595.

Coyne, I. 1997. Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *Journal of Advanced Nursing*, 26: 623- 630.

Creswell, J. 1998. *Qualitative inquiry and research design. Choosing amid five traditions*. United States of America: Sage publications.

Crigger, N. 2008. Towards a viable and just global nursing ethics. *Nursing Ethics*, 15 (1): 17- 27.

Cunha, C., Varughese, C. and Mylonakis, E. 2013. Antimicrobial stewardship programs (ASPs); The devil is in the details. *Virulence*, 4 (2): 147- 149.

D'Amour, D., Ferrada-Videla, M., Rodriguez, L. and Beaulieu, M. 2005. The conceptual basis for interprofessional collaboration: Core concepts and theoretical frameworks. *Journal of Interprofessional Care*, 1: 116- 131.

Daly, J., Willis, K., Small, R., Green, J., Welch, N., Kealy, M. and Hughes, E. 2007. A hierarchy of evidence for assessing qualitative health research. *Journal of Clinical Epidemiology*, 60: 43- 49.

Dancer, S. 2013. Infection control in the post-antibiotic era. *Healthcare Infection*, 18: 51- 60.

Danielson, E. and Berntsson, L. 2007. Registered nurses' perceptions of educational preparation for professional work and development in their profession. *Nurse Education Today*, 27: 900- 908.

Davids, J. 2006. Continuing professional development in nursing. *Submitted as a dissertation for PHD*. University of Stellenbosch, South Africa. accessed November, 2014. <http://scholar.sun.ac.za/handle/10019.1/2816>

Davis, S. 2015. Antibiotic resistance 'could end modern medicine'. *Chief Medical Officer report UK*, <https://www.mrc.ac.uk/.../pdf/antimicrobial-resistance-timeline-report/>

De Beer, J., Brysiewicz, P. and Bhengu, B. 2011. Intensive care nursing in South Africa. *South African Journal of Critical Care*, 27 (1): 6- 10.

Decker, B. and Masur, H. 2015. Bad bugs, no drugs: Are we part of the problem, or leaders in developing solutions? *Critical Care Medicine*, 43 (6): 1153- 1155.

Deege, M. and Paterson, D. 2011. Reducing the development of antibiotic resistance in critical care units. *Current Pharmaceutical Biotechnology*, 12: 2062- 2069.

Dellinger, R., Levy, M., Rhodes, R., Annane, D., Gerlach, H., Opal, S., Sevransky, J., Sprung, C., Douglas, I., Jaeschke, R., Osborn, T., Nunnally, M., Townsend, S., Reinhart, K., Kleinpell, R., Angus, D., Deutschman, C., Machado, F., Rubenfeld, G., Webb, S., Beale, R., Vincent, J. and Moreno, R. 2013. Surviving sepsis campaign: International guidelines for management of severe sepsis and septic shock. *Intensive Care Medicine*, 39: 165- 228.

Dellit, T., Owens, R., McGowan, J., Gerding, D., Weinstein, R., Burke, J., Huskins, C., Paterson, D., Fishman, N., Carpenter, C., Brennan, J., Billeter, M. and Hooton, T. 2007. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. Guidelines for developing an institutional program to enhance antimicrobial stewardship. *Clinical Infectious Diseases*, 44:159- 177.

- Dennis, A and Martin, P. 2005. Symbolic interactionism and the concept of power. *The British Journal of Sociology*, 56 (2): 191- 213.
- Department of Health. 2012. *The National Strategic Plan for Nurse Education, Training and Practice*. 2012/13 – 2016/17. DOH. South Africa. accessed November, 2014. [http://www.sanc.co.za/archive/archive2013/linked\\_files/Strategic\\_Plan\\_for\\_Nurse\\_Education\\_Training\\_and\\_Practice.pdf](http://www.sanc.co.za/archive/archive2013/linked_files/Strategic_Plan_for_Nurse_Education_Training_and_Practice.pdf)
- Deroukakis M. 2007. Mandatory substitution successful. *South African Medical Journal*, 97 (1): 63-64.
- Despins, L. 2009. Patient safety and collaboration of the intensive care unit team. *Critical Care Nurse*, 29 (2): 85- 92.
- DiCicco-Bloom, B. and Crabtree, B. 2006. The qualitative research interview. *Medical Education*, 40: 314- 321.
- DiazGranados, C. 2012. Prospective audit for antimicrobial stewardship in intensive care: Impact on resistance and clinical outcomes. *American Journal of Infection Control*, 40: 526- 529.
- Dickson, G. and Flynn, L. 2012. Nurses' clinical reasoning: Processes and practices of medication safety. *Qualitative Health Research*, 22 (1): 3- 16.
- Donchin, Y., Gopher, D., Olin, M., Badihi, Y., Biesky, M., Sprung, C., Pizov, R. and Cotev, S. 2003. A look into the nature and causes of human errors in the intensive care unit. *Quality and Safety in Health Care*, 12: 143- 148.
- Doody, O. and Noonan, M. 2013. Preparing and conducting interviews to collect data. *Nurse Researcher*, 20 (5): 28- 32.
- Doron, S. and Davidson, L. 2011. Antimicrobial stewardship. *Mayo Clinic Proceedings*, 86 (11): 1113- 1123.
- Dos Santos, R., Jacoby, T., Machado, D., Lisboa, T., Gastal, S., Nagel, F., Kuplich, M., Konkewicz, L. and Lovatto, C. 2011. Hand hygiene, and not ertapenem use, contributed to reduction of carbapenem-resistant *Pseudomonas aeruginosa* rates. *Infection Control and Hospital Epidemiology*, 32 (6): 584- 590.
- Dovlo, D. 2007. Migration of nurses from Sub-Saharan Africa: a review of issues and challenges. *Health Services Research*, 42 (3):1373- 1388.
- Dracup, K. and Bryan-Brown, C. 2006. Creating a new tipping point in intensive care. *American Journal of Critical Care*, 15 (6): 537- 539.

- Drew, R. 2009. Antimicrobial stewardship programs: How to start and steer a successful program. *Journal of Managed Care Pharmacy*, 15 (2): 18- 23.
- Dryden, M., Cooke, J. and Davey, P. 2009. Antibiotic stewardship - more education and regulation not more availability? *Journal of Antimicrobial Chemotherapy*, 64: 885- 888.
- Du Toit, B. 2012. Antimicrobial stewardship. *Mediclinic Nursing*, 26- 27.
- ECONEX Trade, Competition & Applied Economics. 2013. The South African private healthcare sector: Role and contribution to the economy. accessed September 2015. [econex.co.za/wp-content/uploads/2015/.../econex\\_researchnote\\_32.pdf](http://econex.co.za/wp-content/uploads/2015/.../econex_researchnote_32.pdf)
- Edmond, M. and Wenzel, R. 2013. Screening inpatients for MRSA - Case closed. *New England Journal of Medicine*, 368 (24): 2314- 2315.
- Edwards, R., Drumright, L., Kiernan, M. and Holmes, A. 2011. Covering more territory to fight resistance: Considering nurses' role in antimicrobial stewardship. *Journal of Infection Prevention*, 12 (1): 6- 19.
- Edwards, R., Loveday, H., Drumright, L. and Holmes, A. 2011. Should nurses be more involved in antimicrobial management? *Journal of Infection Prevention*, 12 (4): 4- 5.
- Elo, S. and Kyngas, H. 2008. The qualitative content analysis process. *Journal of Advanced Nursing*, 62 (1): 107- 115.
- Emanuel, E., Wendler, D. and Grady, C. 2000. What makes clinical research ethical? *Journal of the American Medical Association*, 283: 2701- 2711.
- Emeghebo, L. 2012. The image of nursing as perceived by nurses. *Nurse Education Today*, 32: 49- 53.
- Erlingsson, C and Brysiewicz, P. 2012. Orientation among multiple truths: An introduction to qualitative research. *African Journal of Emergency Medicine*, 1- 8.
- Essack, S. 2006. Strategies for the prevention and containment of antibiotic resistance. *Professional Nursing Today*, 10 (1): 6- 9.
- Essack, S. 2015. Biographical data. accessed September 2015. [shs.ukzn.ac.za/.../Biosketch\\_2012\\_-\\_Professor\\_Sabiha\\_Essack.sflb.ashx](http://shs.ukzn.ac.za/.../Biosketch_2012_-_Professor_Sabiha_Essack.sflb.ashx)
- Farrer, F. 2011. Making sense of antibiotics. *Professional Nursing Today*, 15 (2): 29-36.



- Fessler, H. and Brower, R. 2005. Protocols for lung protective ventilation. *Critical Care Medicine*, 33 (3): 223- 227.
- FIDSSA. 2012. 1st South African Antibiotic Stewardship Programme (SAASP) Conference. *The Federation of Infectious Diseases Societies of Southern Africa. Quarterly*, 3 (1): 2- 4.
- Finch, R. 2010. Generic antibiotics, antibiotic resistance, and drug licensing. *The Lancet Infectious Diseases*, 10 (11): 754.
- Fleming, A. 1945. Penicillin. *Nobel Prize speech*, [www.nobelprize.org/nobel\\_prizes/medicine/laureates/.../fleming-lecture...](http://www.nobelprize.org/nobel_prizes/medicine/laureates/.../fleming-lecture...)
- Fraimow, H. and Nahra, R. 2013. Resistant gram-negative infections. *Critical Care Clinics*, 29: 895- 921.
- Freeman, M. 2010. Nosocomial pneumonia. *US Pharmacy*, 35 (7): 2- 4.
- Fry, C. 2012. Antimicrobial resistance, responsible prescribing - a call to action for nurses. *Journal of Infection Prevention*, 13 (6): 182.
- Fulbrook, P. 2005. Evidence-based nursing: Care bundles in critical care: A practical approach to evidence-based practice. *9<sup>th</sup> Congress of the World Federation of Societies of Intensive and Critical Care Medicine*. Buenos Aires, Argentina.
- Fulbrook, P., Albarran, J., Baktoft, B. and Sidebottom, B. 2012. A survey of European intensive care nurses' knowledge levels. *International Journal of Nursing Studies*, 49:191- 200.
- Fusch, P. and Ness, L. 2015. Are we there yet? Data saturation in qualitative research. *The Qualitative Report*, 20 (9): 1408- 1416.
- Gallagher, R. and Storr, J. 2012. Nurses can lead drive to minimise antibiotic use. *Nursing Standard*, 14 (27): 11.
- Gardner, A., Hase, S., Gardner, G., Dunn, S. and Carryer, J. 2008. From competence to capability: a study of nurse practitioners in clinical practice. *Journal of Clinical Nursing*, 17: 250- 258.
- Gauzit, R. and Lakdhari, M. 2012. Generic antibiotic drugs: is effectiveness guaranteed? Abstract. *Medecine et Maladies Infectieuses*, 42 (4): 141- 148.
- George, G., Quinlan, T. and Reardon, C. 2009. Human resources for health: a needs and gaps analysis of HRH in South Africa. *Health Economics and HIV and AIDS Research Division (HEARD)*. University of KwaZulu-Natal, Durban, South Africa.

- Gillespie, E., Rodrigues, A., Wright, L., Williams, N, and Stuart, R. 2013. Improving antibiotic stewardship by involving nurses. *American Journal of Infection Control*, 41: 365- 367.
- Gillespie, R. 2007. Improving the quality of care of the critically ill patient: Implementing the care bundle approach in the ICU. *South African Journal of Critical Care*, 23 (2): 55- 60.
- Gillespie, R. 2008. Improving the quality of care of the critically ill patient: Implementing the central venous line care bundle in the ICU. *South African Journal of Critical Care*, 24 (1): 26- 31.
- Gillespie, R. 2009. Prevention and management of ventilator-associated pneumonia – the care bundle approach. *South African Journal of Critical Care*, 25 (2): 45- 51.
- Gillespie, R. 2014. Lessons learnt through simulation training. *Annual Congress. Critical Care Society of South Africa, 2014*. Cape Town, South Africa.
- Goeschel, C. 2011. Nursing leadership at the crossroads: evidence-based practice ‘Matching Michigan-minimizing catheter related blood stream infections’. *Nursing in Critical Care*, 16 (1): 35- 42.
- Gopalan, D. 2014. How should we benchmark our ICUs? *Annual Congress. Critical Care Society of South Africa, 2014*. Cape Town, South Africa.
- Gottlieb, T. and Nimmo, G. 2011. Antibiotic resistance is an emerging threat to public health: an urgent call to action at the Antimicrobial Resistance Summit 2011. *Medical Journal of Australia*, 194 (6): 281- 283.
- Gould, D., Drey, N. and Berridge, E. 2007. Nurses’ experiences of continuing professional development. *Nurse Education Today*, 27: 602–609.
- Gould, D. 2008. Audit and research: similarities and differences. *Nursing Standard*, 22 (37): 51- 56.
- Gould, I. and Bal, A. 2013. New antibiotic agents in the pipeline and how they can help overcome microbial resistance. *Virulence*, 4 (2): 185- 191.
- Graneheim, U. and Lundman, B. 2004. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, 24: 105- 112.
- Grunwald, J., Zervos, J., Zervos, M. and Brar. I. 2014. Antimicrobial stewardship: Strategies for a global response. *Journal of Health and Research*, 1 (1): 4- 10.
- Guba, E. 1981. Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Communication and Technology*, 29 (2): 75- 91.

- Hadjibalassi, M., Papastavrou, E., Lambrinou, E., Tsangari, H., Athini, E., Georgiou, E., Nicolaou, E. and Merkouris, A. 2012. Development of an instrument to determine competencies of postgraduate ICU nurses in Cyprus. *British Association of Critical Care Nurses. Nursing in Critical Care*, 17 (5): 255- 264.
- Hamilton, K. and Fishman, N. 2014. Antimicrobial stewardship interventions. Thinking inside and outside the box. *Infectious Diseases Clinics North America*, 28: 301- 313.
- Hanekom, S., Coetzee, A. and Faure, M. 2006. Outcome evaluation of a South African surgical ICU – a baseline study. *South African Journal of Critical Care*, 22 (1): 14- 20.
- Harvey, G., Loftus-Hills, A., Rycroft-Malone, J., Titchen, A., Kitson, A., McCormack, B. and Seers, K. 2002. Getting evidence into practice: the role and function of facilitation. *Journal of Advanced Nursing*, 37 (6): 577- 588.
- Hase, S. and Davis, L. 1999. Developing capable employees: The work activity briefing. *Journal of Workplace Learning*, 8: 298- 303.
- Hayashi, Y. and Paterson, D. 2011. Strategies for reduction in duration of antibiotic use in hospitalized patients. *Clinical Infectious Diseases*, 52 (10): 1232- 1240.
- Henneman, E., Gawlinski, A., Blank, F., Henneman, P., Jordan, D., and McKenzie, J. 2010. Strategies used by critical care nurses to identify, interrupt, and correct medical errors. *American Journal of Critical Care*, 19(6): 500 – 509.
- Hill, K. 2003. The sound of silence – nurses’ non-verbal interaction within the ward round. *British Association of Critical Care Nurses, Nursing in Critical Care*, 8 (6): 231-239.
- Hodgson, E. 2014. Challenges facing ICUs in developing countries. *Annual Congress. Critical Care Society of South Africa, 2014*. Cape Town, South Africa.
- Holsti, O. 1969. *Content Analysis for the Social Sciences and Humanities*. Reading, MA: Addison-Wesley.
- Houghton, C., Hunter, A. and Meskell, P. 2012. Linking aims, paradigms and methods in nursing research. *Nurse Researcher*, 20 (2): 34- 39.
- Hranjec, T. and Sawyer, R. 2013. Conservative initiation of antimicrobial treatment in ICU patients with suspected ICU-acquired infection: more haste less speed. *Current Opinion in Critical Care*, 19: 461- 464.

Hsieh, H. and Shannon, S. 2005. Three approaches to qualitative content analysis. *Qualitative Health Research*, 15: 1277- 1288.

Jacob, J. and Gaynes, R. 2010. Emerging trends in antibiotic use in US hospitals: Quality, quantification and stewardship. *Expert Review of Anti Infective Therapy*, 8 (8): 893- 902.

James, J. 2013. A new, evidence-based estimate of patient harms associated with hospital care. *Journal of Patient Safety*, 9 (3): 122- 128.

Jensen, J., Hein, L., Lundgren, B., Bestle, M., Mohr, T., Andersen, M., Løken, J., Tousi, H., Sørensen, P., Lauritsen, A., Strange, D., Petersen, J., Thormar, K., Larsen, K., Drenck, N., Helweg-Larsen, J., Johansen, M., Reinholdt, K., Møller, J., Olesen, B., Arendrup, M., Østergaard, C., Cozzi-Lepri, Grarup, J and Lundgren, J. 2015. Invasive Candida infections and the harm from antibacterial drugs in critically ill patients: data from a randomized, controlled trial to determine the role of ciprofloxacin, piperacillin-tazobactam, meropenem, and cefuroxime. *Critical Care Medicine*, 43 (3): 594-602.

Joel, L. 2004. *Advanced Practice Nursing: Essentials for Role Development*. Philadelphia: FA Davis Company.

Jordan, P., van Rooyen, D. and Venter, D. 2012. Endotracheal tube cuff pressure management in adult critical care units. *South African Journal of Critical Care*, 28(1): 13- 16.

Jutel, A. and Menkes, D. 2010. Nurses' reported influence on the prescription and use of medication. *International Nursing Review*, 57: 92- 97.

Kaki, R., Elligsen, M., Walker, S., Simor, A., Palmay, L. and Daneman, N. 2011. Impact of antimicrobial stewardship in critical care: a systematic review. *Journal of Antimicrobial Chemotherapy*, 66: 1223- 1230.

Kangasniemi, M., Vaismoradi, M., Jasper, M. and Turunen, H. 2013. Ethical issues in patient safety: Implications for nursing management. *Nursing Ethics*, 20 (8): 904- 916.

Kantor, G. 2011. Best Care, Always campaign. *Global forum on bacterial infection*. New Delhi, [www. bestcare.org.za](http://www.bestcare.org.za).

Kantor, G., van den Bergh, D. and Brink. A. 2011. Best Care, Always! *Southern African Journal of Epidemiology and Infection*, 26 (1): 3- 5.

Kantor, G. 2014. HAIs - What do the funders say? *Annual Congress. Critical Care Society of South Africa, 2014*. Cape Town, South Africa.

- Katsios, C., Burry, L., Nelson, S., Jivraj, T., Lapinsky, S., Wax, R., Christian, M., Mehta, S., Bell, C. and Morris, A. 2012. An antimicrobial stewardship program improves antimicrobial treatment by culture site and the quality of antimicrobial prescribing in critically ill patients. *Critical Care*, 16: 1- 9.
- Kaye- Petersen, E. 2004. A continuing professional development system for nurses and midwives in South Africa. *Submitted as a dissertation for PHD*. Rand University, South Africa. accessed November 2014. <https://ujdigispace.uj.ac.za/.../ELIZABETHThesis4April2005.pdf>
- Kindness, K. and Brysiewicz, P. 2010. Evaluation of a protocol to control methicillin- resistant *Staphylococcus aureus* (MRSA) in a surgical cardiac intensive care unit. *South African Journal of Critical Care*, 26 (1): 11- 18.
- Kleinpell, R. 2005. Acute care nurse practitioner practice: Results of a 5-year longitudinal study. *American Journal of Critical Care*, 14: 211- 219.
- Kleinpell, R. 2006. The ICU nurse as the patient's advocate. ppt. World Federation of Critical Care Nurses. accessed November, 2014. [www.wfccn.org](http://www.wfccn.org)
- Kleinpell, R. 2013. Improving practice in critical care 10<sup>th</sup> Congress of the World Federation of Societies of Intensive and Critical Care Medicine. Durban, South Africa.
- Knox, S. and Burkard, A. 2009. Qualitative research interviews. *Psychotherapy Research*, 19 (4-5): 566- 575.
- Kollef, M. and Micek, S. 2012. Antimicrobial stewardship programs: mandatory for all ICUs. *Critical Care*, 16 (179): 1- 2.
- Kramer, M. and Schmalenberg, C. 2008. The practice of clinical autonomy in hospitals: 20 000 nurses tell their story. *Critical Care Nurse*, 28 (6): 58- 71.
- Krauss, S. 2005. Research paradigms and meaning making: A primer. *The Qualitative Report*, 10 (4): 758- 770.
- Krippendorff, K. (1980). *Content analysis. An Introduction to its Methodology*. Beverly Hills: Sage.
- Kuokkanen, L. and Leino-Kilpi, H. 2000. Power and empowerment in nursing: three theoretical approaches. *Journal of Advanced Nursing*, 31(1): 235- 241.
- Kutney-Lee, A., Lake, E. and Aiken, L. 2009. Development of the hospital nurse surveillance capacity profile. *Research in Nursing and Health*, 32: 217- 228.
- Kvarnstrom, S. 2008. Difficulties in collaboration: A critical incident study of interprofessional healthcare teamwork. *Journal of Interprofessional Care*, 22 (2): 191- 203.

KZN Specialist Network. 2014. accessed November 2014. [kznspecialist.co.za/](http://kznspecialist.co.za/)

Landenheim, D., Rosembert, D., Hallam, C. and Micallef, C. 2013. Antimicrobial stewardship: the role of the nurse. *Nursing Standard*, 28 (6): 46- 49.

Le Blanc, P., Schaufeli, W., Salanova, M., Llorens, S. and Nap, R. 2010. Efficacy beliefs predict collaborative practice among intensive care unit nurses. *Journal of Advanced Nursing*, 66 (3): 583-594.

Leape, L., Brennan, T., Laird, N., Lawthers, A., Localio, A., Barnes, B., Hebert, L., Newhouse, J., Weiler, P. and Hiatt, H. 1991. The nature of adverse events in hospitalised patients. *New England Journal of Medicine*, 324: 377- 84.

Lawrence, P. and Fulbrook, P. 2011. The ventilator care bundle and its impact on ventilator-associated pneumonia: a review of the evidence. *Nursing in Critical Care*, 16 (5): 222- 234.

Leapfrog Group. 2014. About the Leapfrog Group. [www.leapfroghospitalsurvey.org](http://www.leapfroghospitalsurvey.org).

Leonard, M., Graham, S. and Bonacum, D. 2004. The human factor: the critical importance of effective teamwork and communication in providing safe care. *Quality and Safety in Health Care*, 13 (1): 85- 90.

Leroy, O., Gangneux, J., Montravers, P., Mira, J., Gouin, F., Sollet, J., Carlet, J., Reynes, J., Rosenheim, M., Regnier, B. and Lortholary, O. 2009. Epidemiology, management, and risk factors for death of invasive *Candida* infections in critical care: A multicenter, prospective, observational study in France (2005–2006). *Critical Care Medicine*, 37 (5): 1612- 1618.

Levy, S. 2001. Antibacterial household products: Cause for concern. *Emerging Infectious Diseases*, 7 (3): 512- 515.

Lewis, P., Dornan, T., Taylor, D., Tully, M., Wass, V. and Ashcroft, D. 2009. The prevalence and incidence of prescribing errors in hospital inpatients: A systematic review. *Drug Safety*, 32 (5): 379-389.

Lincoln, Y. and Guba, E. 1985. *Naturalistic Inquiry*. Beverly Hills, CA: Sage Publications.

Loudon, H. 2012. Microbe matters. Part 2. *Professional Nursing Today*. 16 (2): 36- 43.

Loudon, H. 2014. Antimicrobial stewardship. Master class. St Augustine's Hospital, Durban. South Africa.

Lucet, J., Koulenti, D. and Zahar, J. 2014. Persistence of colonisation with MDRO following discharge from the ICU. *Intensive Care Medicine*, 40: 603- 605.

- MacDougall, C. and Polk, R. 2005. Antimicrobial stewardship programs in health care systems. *Clinical Microbiology Reviews*, 18 (4): 638- 656.
- Madaras-Kelly, K. 2003. Optimizing antibiotic use in hospitals: The role of population-based antibiotic surveillance in limiting antibiotic resistance. *Pharmacotherapy*, 23 (12): 1627- 1633.
- Majumdar, S. and Padiglione, A. 2012. Nosocomial infections in the intensive care unit. *Anaesthesia and Intensive Care Medicine*, 13 (5): 204- 208.
- Manias, E. and Street, A. 2000. Legitimation of nurses' knowledge through policies and protocols in clinical practice. *Journal of Advanced Nursing*, 32 (6): 1467- 1475.
- Manojlovich, M. and DeCicco, B. 2007. Healthy work environments, nurse-physician communication, and patient's outcomes. *American Journal of Critical Care*, 16: 536-543.
- Marshall, M. 1996. Sampling for qualitative research. *Family Practice*, 13(6): 522-525.
- Martin, J., Ummenhofer, W., Manser, T. and Spirig, R. 2010. Interprofessional collaboration among nurses and physicians: Making a difference in patient outcome. *Swiss Medical Weekly*, 140: 1-7.
- Mathivha L. 2002. ICUs worldwide: An overview of critical care medicine in South Africa. *Critical Care*, 6: 22- 23.
- Matlakala, M. 2012. Strategies to overcome the challenges in the management of larger critical care units. *Submitted as a dissertation for PHD in Health Studies*, University of South Africa. accessed August 2015. [uir.unisa.ac.za/bitstream/handle/10500/15417/thesis\\_matlakala\\_mc.pdf](http://uir.unisa.ac.za/bitstream/handle/10500/15417/thesis_matlakala_mc.pdf)
- Matsebula, T. and Willie, M. 2007. Private hospitals grow while public sector contracts. *The South African Health News Service*. accessed October 2015. <http://www.health-e.org.za/2007/12/04/private-hospitals-grow-while-public-sector-contracts/>
- Mayosi, B., Lawn, Y., van Niekerk, A., Bradshaw, D., Karim, S. and Coovadia, H. 2012. Health in South Africa: changes and challenges since 2009. *Lancet*, 380: 2029- 2043.
- Mayring, P. 2000. Qualitative content analysis. *Forum: Qualitative Social Research*, 1 (2): 1- 11.
- McInnes, E., Phillips, R., Middleton, S. and Gould, D. 2014. A qualitative study of senior hospital managers' views on current and innovative strategies to improve hand hygiene. *BioMed Central Infectious Diseases*, 14 (611): 1-12.
- McIntosh, J. (2008). An investigation into the effect of a staffing strategy on patient care in a selected hospital in KwaZulu-Natal. *Submitted as a dissertation for Masters in Nursing Science*. Stellenbosch

University. accessed August 2015.

[https://ir1.sun.ac.za/bitstream/handle/.../mcintosh\\_investigation\\_2008.pdf](https://ir1.sun.ac.za/bitstream/handle/.../mcintosh_investigation_2008.pdf)

McKenzie, D., Rawlins, M. and del Mar, C. 2013. Antimicrobial stewardship: what's it all about? *Australia Prescriber*, 36: 116- 20.

MedNurse Health Recruitment. 2015. Recruitment advertisement. ECP #1690 – Enrolled Nurse – ICU. <http://www.mednurse.co.za/job/ecp-1690-enrolled-nurse-icu/>

Memela, M. and Gopalan, D. 2014. Variations in endotracheal tube cuff pressure: Is 8-hourly monitoring enough? *The Southern African Journal of Critical Care*, 30 (2): 35- 40.

Mendelson, M., Whitelaw, A., Nicol, M. and Brink, A. 2012. Wake up, South Africa! The antibiotic 'horse' has bolted. *South African Medical Journal*, 102 (7): 607- 608.

Mer, M. 2003. Fungal infection in critically ill patients. *South African Journal of Critical Care*, 19 (1): 20- 27.

Mer, M. 2006. Intravascular catheter-related infection – current concepts. *South African Journal of Critical Care*, 22 (1): 4- 12.

Michell, W. 2006. Drug safety in the intensive care unit. *South African Journal of Critical Care*, 22 (2): 48.

Michell, W. 2010. Nosocomial infection in South African intensive care units. *South African Journal of Critical Care*, 26 (1): 4.

Michell, W. 2011. Malpractice in the intensive care unit. *South African Journal of Critical Care*, 27 (1): 2- 4.

Miller, A. and Chaboyer, W. 2006. Captain and champion: nurses' role in patient safety. *Nursing in Critical Care*, 11 (6): 265- 266.

Moleki, M. 2008. Critical care nursing students' experience of clinical accompaniment in open distance learning (ODL): A phenomenological perspective. *Submitted as a dissertation for PHD in Nursing Science, University of South Africa.* accessed November, 2014. [uir.unisa.ac.za/bitstream/handle/.../dissertation\\_moleki\\_%20m.pdf?...1](http://uir.unisa.ac.za/bitstream/handle/.../dissertation_moleki_%20m.pdf?...1)

Moola, D., Ehlers, V. and Hattingh, S. 2008. Critical care nurses' perceptions of stress and stress-related situations in the workplace. *Curationis*, 31 (2): 74- 83.

Morolong, B. and Chabeli, M. 2005. Competence of newly qualified registered nurses from a nursing college. *Curationis*, 28 (2): 38- 50.



- Morse, J., Barrett, M., Mayan, M., Olson, K and Spiers, J. 2002. Verification strategies for establishing reliability and validity in qualitative research. *Journal of Qualitative Methods*, 1 (2): 13-22.
- Morse, J. 2008 Confusing categories and themes. *Qualitative Health Research*, 18 (6): 727- 728.
- Motsoaledi, A. 2013. Roots of health revolution. *Sunday Tribune*, August 24. Independent Newspapers. Durban, South Africa.
- Naidoo, K., Singh, J. and Lalloo, U. 2013. Critical analysis of ICU/HC beds in South Africa: 2008-2009. *South African Medical Journal*, 103 (10): 751- 753.
- Needleman, J., Bauerhaus, P., Stewart, M., Zelvinsky, K. and Mattke, S. 2006. Nurse staffing in hospitals: Is there a business case for quality? *Health Affairs*, 25 (1): 204-11.
- Nelson, G., King, L. and Brodine, S. 2008. Nurse-physician collaboration on medical-surgical units. *Medical/Surgical Nursing*, 17(1): 35- 40.
- Norushe, T., Van Rooyen, D. and Strumpher, E. 2004. In-service education and training as experienced by registered nurses. *Curationis*, 63 -72.
- O'Grady, N., Murray, P. and Ames, N. 2012. Preventing ventilator-associated pneumonia. Does the evidence support the practice? *Journal of the American Medical Association*. 307 (23): 2534- 2539.
- O'Halloran, P. 2008. Commentary: Hugonnet, S. *et al.* (2007). The effect of workload on infection risk in critically ill patients. *Nursing in Critical Care*, 13 (5): 276- 277.
- Ohl, C. and Luther, V. 2014. Health care provider education as a tool to enhance antibiotic stewardship practices. *Infectious Diseases Clinics of North America*, 28: 177- 193.
- Olans, R. 2013. The role of the nurse in antimicrobial stewardship. 25<sup>th</sup> *International Nursing Research Congress*. accessed July, 2013. <https://stti.confex.com/stti/congrs13/webprogram/Paper53400.html>
- Oosthuizen, M. and Ehlers, V. 2007. Factors that may influence South African nurses' decision to emigrate. *Health SA Gesondheid*, 12 (12): 14- 26.
- Papathanassoglou, E., Karanikola, M., Kalafati, M., Giannakopoulou, M., Lemonidou, C. and Albarran, J. 2012. Professional autonomy, collaboration with physicians, and moral distress among European intensive care nurses. *American Journal of Critical Care*, 21 (2): 45- 52.
- Paruk, F., Richards, G., Scribante, J., Bhagwanjee, S., Mer, M. and Perrie, H. 2012. Antibiotic prescription practices and their relationship to outcome in South African intensive care units: Findings

of the Prevalence of Infection in South African Intensive Care Units (PISA) Study. *South African Medical Journal*, 102 (7): 613- 616.

Paterson, D. 2006. The role of antimicrobial management programs in optimizing antibiotic prescribing within hospitals. *Clinical Infectious Diseases*, 42 (2): 90- 95.

Paterson, D. 2007. Optimizing antimicrobial therapy for serious infections in the critically ill. *Seminars in Respiratory and Critical Care Medicine*, 28(6): 575- 577.

Patton, M. 2002. *Qualitative Evaluation and Research Methods*, Newbury Park, Calif.: Sage Publications, Inc.

Peel, M. 2008. Care bundles: Resuscitation of patients with severe sepsis. *Nursing Standard*, 23 (11): 41- 46.

Perovic, O. 2011. Infection control in ICU. *Nesibopho best practice Guidelines: Critical Care Society of South Africa*, 1- 17.

Perrie, H. 2006. Knowledge of ICU nurses with regard to the implementation of protocol based care in public and private health care institutions. *Submitted as a dissertation for Masters in Nursing*. University of Witwaterstrand, South Africa. accessed November 2014. <http://wiredspace.wits.ac.za/bitstream/handle/10539/5688/Dissertation.pdf?sequence=2>

Perrie, H., Schmollgruber, S., Bruce, J. and Becker, P. 2014. Knowledge of intensive care nurses in selected care areas commonly guided by protocols. *South African Journal of Critical Care*, 30 (1): 14- 18.

Pillay, R. 2009. Work satisfaction of professional nurses in South Africa: a comparative analysis of the public and private sectors. *Human Resources for Health*, 7 (15): 1- 10.

Powell, A., and Davies, H. 2012. The struggle to improve patient care in the face of professional boundaries. *Social Science & Medicine*, 75: 807- 814.

Pretorius, R. and Kloppe, H. 2012. Positive practice environments in critical care units in South Africa. *International Nursing Review*, 59: 66- 72.

Propp, K., Apker, J., Ford, W., Wallace, W., Serbenski, M. and Hofmeister, N. 2010. Meeting the complex needs of the health care team: Identification of nurse/team communication practices perceived to enhance patient outcomes. *Qualitative Health Research*, 20 (1): 15- 28.

Ralls, M., Miyasaka, E, and Teitelbaum, D. 2014. Intestinal microbial diversity and perioperative complications. *Journal of Parenteral and Enteral Nutrition*, 38: 392- 399.

- Rice, L. 2003. Controlling antibiotic resistance in the ICU: Different bacteria, different strategies. *Cleveland Clinic Journal of Medicine*, 70 (9): 793- 800.
- Richards, G. 2005. The therapeutic challenge of Gram-negative sepsis: Prolonging the lifespan of a scarce resource. *Clinical Microbiology and Infection*, 11 (Suppl. 6): 18- 22.
- Richards, G. 2010. Antibiotic therapy of surgical infections. *South African Journal of Critical Care*, 26 (1): 6- 10.
- Richards, L. 2007. Perceptions of registered nurses with regard to continuing formal education. *Submitted as a dissertation for Masters in Health Studies*. University of South Africa. accessed August, 2015. [uir.unisa.ac.za/bitstream/handle/10500/572/dissertation.pdf](http://uir.unisa.ac.za/bitstream/handle/10500/572/dissertation.pdf)
- Richards, L. and Potgieter, E. 2010. Perceptions of registered nurses in four state health institutions on continuing formal education. *Curationis*, 33 (2): 41- 50.
- Rose, L. 2011. Interprofessional collaboration in the ICU: how to define? *Nursing Critical Care*, 16 (1): 5- 10.
- Schluter, J., Seaton, P. and Chaboyer, W. 2011. Understanding nursing scope of practice: A qualitative study. *International Journal of Nursing Studies*, 48: 1211- 1222.
- Schmalenberg, C. and Kramer, M. 2009. Nurse-physician relationships in hospitals: 20 000 Nurses tell their story. *Critical Care Nurse*, 29(1): 74- 83.
- Schuetza, P., Raadb, I. and Aminc, D. 2013. Using procalcitonin-guided algorithms to improve antimicrobial therapy in ICU patients with respiratory infections and sepsis. *Current Opinion in Critical Care*, 19:453- 460.
- Scribante, J., Muller, M. and Lipman, J. 1995. Interpretation of the scope of practice of the South African critical care nurse. *South African Medical Journal*, 85 (5): 437- 441.
- Scribante, J. and Bhagwanjee, S. 2007. ICU nurse allocation in a cardiothoracic ICU: How many hands do we need? *South African Journal of Critical Care*, 23 (2): 66- 69.
- Scribante, J. and Bhagwanjee, S. 2007. National audit of critical care resources in South Africa – unit and bed distribution. *South African Medical Journal*, 97 (12): 1311- 1314.
- Scribante, J. and Bhagwanjee, S. 2007. National audit of critical care resources in South Africa – nursing profile. *South African Medical Journal*, 97(12): 1315- 1318.
- Scribante, J. and Bhagwanjee, S. 2007. National audit of critical care resources in South Africa – open versus closed intensive and high care units. *South African Medical Journal*, 97(12): 1319- 1322.

- Searle, C. 2002. Quality issues in qualitative inquiry. *Qualitative Social Work*, 1(1): 97- 110.
- Sheehan, D., Robertson, L. and Ormond, T. 2007. Comparison of language used and patterns of communication in interprofessional and multidisciplinary teams. *Journal of Interprofessional Care*, 21 (1): 17- 30.
- Sheer, B and Wong, F. 2008. The development of advanced nursing practice globally. *Journal of Nursing Scholarship*, 40 (3): 204- 211.
- Shenton, K. 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22: 63- 75.
- Skar, R. 2009. The meaning of autonomy in nursing practice. *Journal of Clinical Nursing*, 19: 2226- 2234.
- Smith, R. and Coast, J. 2002. Antimicrobial resistance: a global response. *Bulletin of the World Health Organization*, 80 (2): 126- 133.
- South African Medicines Formulary. 2012. 9<sup>th</sup> ed. Health and Medical Publishing Group. Cape, South Africa.
- South African Nursing Council. *Regulation 2598. Nursing Act, 1078 (Act 50 of 1978). Regulations relating to the scope of practice of persons who are registered or enrolled under the Nursing Act 1978.* Pretoria, South Africa. accessed November 2014. <http://www.sanc.co.za/pdf/Nursing%20Act%202005.PDF>
- South African Nursing Council. *Government Notice No. R. 212 as amended by No. R. 74, 1997. Regulations relating to the course in clinical nursing science leading to registration of additional qualification.* Pretoria, South Africa. accessed September 2014. <http://www.sanc.co.za/regulat/Reg-cln.htm>
- South African Nursing Council. Competencies for critical care nurse specialist (adult). accessed 2014. [www.sanc.co.za/.../Competencies/SANC%20Competencies-Critical%20C](http://www.sanc.co.za/.../Competencies/SANC%20Competencies-Critical%20C)
- South African Nursing Council. 2013. Code of ethics for nursing practitioners in South Africa. accessed October 2015. [www.sanc.co.za/.../SANC%20Code%20of%20Ethics%20for%20Nursing...](http://www.sanc.co.za/.../SANC%20Code%20of%20Ethics%20for%20Nursing...)
- Spellberg, B., Powers, J., Brass, J., Miller, L. and Edwards, J. 2004. Trends in antimicrobial drug development. *Clinical Infectious Diseases*, 38: 1279- 1286.
- Spellberg, B., Bartlett, J. and Gilbert, D. 2013. The future of antibiotics and resistance. *New England Journal of Medicine*, 368 (4): 299- 302.

- Srinivasan, A., Song, X., Richards, A., Sinkowitz-Cochran, R., Cardo, D. and Rand, C. 2004. A survey of knowledge, attitudes, and beliefs of house staff physicians from various specialties concerning antimicrobial use and resistance. *Archives of Internal Medicine*, 164: 1451- 1456.
- Srivastava, N., Tucker, J., Draper, E and Milner, M. 2008. A literature review of principles, policies and practice in extended nursing roles relating to UK intensive care settings. *Journal of Clinical Nursing*, 17: 2671- 2680.
- Stein-Parbury, J. and Liaschenko, J. 2007. Understanding collaboration between nurses and physicians as knowledge at work. *American Journal of Critical Care*, 16 (5): 470-477.
- Stemler, S. 2001. An overview of content analysis. *Practical Assessment, Research & Evaluation*, 7 (17): 1- 10.
- Storey, D., Patel, P., Nguyen, A. and Chang, F. 2012. Implementation of an antimicrobial stewardship program on the medical-surgical service of a 100-bed community hospital. *Antimicrobial Resistance and Infection Control*, 1 (32): 1- 8.
- Suominen, T., Savikko, N., Puukka, P., Doran, I. and Leino-Kilpi, H. 2005. Work empowerment as experienced by head nurses. *Journal of Nursing Management*, 13: 147- 153.
- Taxis, K. and Barber, N. 2003. Causes of intravenous medication errors: an ethnographic study. *Quality and Safety in Health Care*, 12: 343- 348.
- Thom, A. 2008. Private hospitals grow while public sector contracts. accessed October 2008. <http://www.health-enews>.
- Thorsteinsdottir, R. 2005. Role development: Making decisions. *9<sup>th</sup> Congress of the World Federation of Societies of Intensive and Critical Care Medicine*. Buenos Aires, Argentina.
- Traynor, M., Boland, M. and Buus, N. 2010. Professional autonomy in 21st century healthcare: Nurses' accounts of clinical decision-making. *Social Science & Medicine*, 71: 1506- 1512.
- Uys, L. and Klopper, H. 2013. What is the ideal ratio of categories of nurses for the South African public health system? *South African Journal of Science*, 109 (5/6): 1- 4.
- Valentin, A. 2013. Approaches to decreasing medication and other care errors in the ICU. *Current Opinion in Critical Care*, 19: 474- 479.
- Van den Bergh, D., Devenish, L. and Swart, K. 2015. The whole is greater than a sum of the parts – a multi-hospital quality improvement journey reduces healthcare associated infection risk. accessed August 2015.

<http://www.bestcare.org.za/file/view/47+The+whole+is+greater+than+the+sum+of+the+parts+%E2%80%93.pdf>

Van der Colff, J. and Rothmann, S. 2009. Occupational stress, sense of coherence, coping, burnout and work engagement of registered nurses in South Africa. *South African Journal of Industrial Psychology*, 35 (1): 1- 10.

Van der Merwe, E., Kidd, M., Metzker, S., Bolliger, C. and Irusen, E. 2005. Validating the use of the APACHE II score in a tertiary South African ICU. *South African Journal of Critical Care*, 21 (1): 46-54.

Van Saene, H., Curran, R., Stoutenbeck, C. and Percival, A. 1990. What the intensivist should know about bacteriology. *South African Journal of Critical Care*, 6 (1): 5- 8.

Vasuthevan, S. 2012. Best Care, Always! Initiative – Powerful leadership & management. *Forum for Professional Nurse Leaders Conference*. South Africa. accessed June, 2014.  
[fpnl.co.za/.../presentations2012/Dr%20Sharon%20Vasuthevan%20Best%20Care%20Always!%20Initiative.pdf](http://fpnl.co.za/.../presentations2012/Dr%20Sharon%20Vasuthevan%20Best%20Care%20Always!%20Initiative.pdf)

Vesga, O., Agudelo, M., Salazar, B., Rodriguez, C. and Zuluaga, C. 2010. Generic vancomycin products fail in vivo despite being pharmaceutical equivalents of the innovator. *Antimicrobial Agents and Chemotherapy*, 54 (8): 3271- 3279.

Vivian, L., Marais, A., McLaughlin, S., Falkenstein, S. and Argent. A. 2009. Relationships, trust, decision-making and quality of care in a paediatric intensive care unit. *Intensive Care Medicine*, 35(9): 1593- 1598.

Wasserman, S., Boyles, T. and Mendelson, M. 2014. A pocket guide to Antibiotic prescribing for adults in South Africa. *South African Antibiotic Stewardship Programme (SAASP)*. Distributed to South African hospitals.

Watson, R. 2008. Commentary on Gardner A, Hase S, Gardner G, Dunn SV and Carryer J. 2008. From competence to capability: a study of nurse practitioners in clinical practice. *Journal of Clinical Nursing*, 17: 250- 258.

Weiss, C., DiBardino, D., Rho, J., Sung, N., Collander, B. and Wunderink, R. 2013. A clinical trial comparing physician prompting with an unprompted automated electronic checklist to reduce empirical antibiotic utilization. *Critical Care Medicine*, 41 (11): 1-7.

Weiss, C. and Wunderink, R. 2013. Prompting physicians to address a daily checklist for antibiotics: do we need a co-pilot in the ICU? *Current Opinion in Critical Care*, 19 (5): 448- 452.

Welters, I., Gibson, J., Mogk, M. and Wenstone, R. 2011. Major sources of critical incidents in intensive care. *Critical Care*, 15: 1- 8.

Wildschut, A. and Mqolozana, T. 2008. A multiple source identification and verification of scarce and critical skills in the South African labour market. Commissioned by the Department of Labour. Human Sciences Research Council (HSRC) of South Africa, accessed August 2015.  
[www.labour.gov.za/DOL/downloads/documents/.../nursesshortage.pdf](http://www.labour.gov.za/DOL/downloads/documents/.../nursesshortage.pdf)

Williams, G., Schmollgruber, S. and Alberto, L. 2006. Consensus forum: Worldwide guidelines on the critical care nursing workforce and education standards. *Critical Care Clinics*, 22: 393- 406.

Williams, G., Bost, N., Chaboyer, W., Fulbrook, P., Alberto, L., Thornsteindóttir, R., Schmollgruber, S. and Chan, D. 2012. Critical care nursing organizations and activities: a third worldwide review. *International Nursing Review*, 59: 73- 80.

Whitelaw, A. 2015. Role of infection control in combating antibiotic resistance. *The South African Medical Journal*, 105 (5): 1- 5.

Woolhouse, M. and Ward, M. 2013. Sources of antimicrobial resistance. *Science*, 341: 1460- 1461.

World Health Organization. 2006. World health statistics 2006. Geneva, Switzerland. accessed November 2014. <http://www.who.int/whosis/whostat2006.pdf>

World Health Organization. 2011. World Health Day 2011. accessed November, 2014.<http://www.who.int/world-health-day/2011>

World Health Organization. 2013. Fact sheet N°194. accessed August, 2014. <http://www.who.int/mediacentre/factsheets/fs194/en/>

World Health Organisation. 2014. Antimicrobial resistance. Global Report on surveillance. accessed August, 2014. [www.who.int/drugresistance](http://www.who.int/drugresistance)

World Health Organization. 2015. World antibiotic awareness week. <http://www.who.int/mediacentre/events/2015/world-antibiotic-awareness-week/event/en/>

Wynd, C. 2003. Current factors contributing to professionalism in nursing. *Journal of Professional Nursing*, 19 (5): 251- 261.

Zhang, Y. and Wildemuth, B. 2005. Qualitative analysis of content. *Analysis*, 1 (2): 1-12.

Ziady, L. 2012. Antibiotic stewardship: a nut without a definite shell to crack. *Professional Nursing Today*, 16 (5): 12- 14.

Zwarenstein, M. and Reeves, S. 2002. Working together but apart: Barriers and routes to nurse-physician collaboration. *Journal on Quality Improvement*, 28 (5): 242- 247.



## ANNEXURE A

### INTERVIEW GUIDE

The duration of this interview is anticipated to be approximately 30 minutes. The following questions are meant as a guide to the interviewer. The participant will be encouraged to speak freely and these questions will be asked when necessary to elicit data.

- 1. Greeting to participant*
- 2. Re-confirmation with participant of consent, confidentiality and withdrawal choice*
- 3. General information regarding interview, i.e. time anticipated, recording of interview*
- 4. Confirmation that the participant is comfortable with this*

1. What does antimicrobial stewardship mean to you?
2. How does it work?
3. What does antimicrobial stewardship team mean to you?
4. What part do you play in this team?
5. How important do you see the part that you play in this team?
6. What is the part that the intensive care nurse plays in this team?
7. How important do you see the part that the intensive care nurse plays in this team?
8. What suggestions can you make that would develop the nurse's role in this antimicrobial stewardship team?
9. What do you think are some of the barriers to developing the nurse's role in this antimicrobial stewardship team?
10. How well does this team work together?
11. What are some of the problems that you find in this team?
12. Would you like to add anything else?

## ANNEXURE B

### PARTICIPANT INFORMATION SHEET

3 St Clair Road

Everton

3610

*date 2014*

#### INFORMATION SHEET

Research study: Masters Nursing  
Joan Rout: Student no. 212542357

Dear .....

My name is Joan Rout. I am registered with the University of KwaZulu-Natal to study for a Masters Degree in Critical Care and Trauma Nursing. As part of this degree I am required to undertake a research study in this field under the supervision of Dr Jennifer de Beer at the School of Nursing, College of Health Sciences, at the Howard College Campus, University of KwaZulu-Natal, Durban.

You are being invited to consider participating in a study that involves research into the role of the intensive care nurse within the antimicrobial stewardship team, in the general ICU in this hospital. The aim and purpose of this study is to research the functioning of the antimicrobial stewardship team in ICU in this hospital, and the role of the nurse within this team. The study is expected to enrol 16 participants in total. A single private interview of approximately 30 minutes will take place over a period of two weeks from \_\_\_\_\_ to \_\_\_\_\_. This will be at a time that you find convenient and which does not interfere with patient care. You may be asked to confirm transcriptions and analysis of this interview at a later stage. This will be done at your own convenience.

The general findings of this study, once completed, will be made available to the participants, the ICU unit manager and the hospital. I hope that the study will create beneficial changes in the way that intensive care nurses in this unit participate in the monitoring and management of antimicrobial therapy. I hope that with publication of this study there will be useful information to inform nursing practice, policy and education in the wider nursing community.

Participation in this research is voluntary and you may withdraw participation at any point. Please inform me should you wish to do this. Your identity and any comments you make will be protected by anonymity and your participation will remain confidential. You will be asked to choose a pseudonym which will be used throughout the study and data will not be able to be traced back to the individual. All recordings and transcripts of these recordings will be kept in a locked cabinet for the duration of the study and for a period of five years, after which they will be destroyed by shredding.

Kind Regards

Joan Rout

This study has been ethically reviewed and approved by the UKZN Biomedical Research Ethics Committee (approval number BE281-14).

In the event of any problems or concerns/questions you may contact the researcher at 083 7831008 or on e-mail [joanrout@worldonline.co.za](mailto:joanrout@worldonline.co.za) . Dr de Beer can be contacted on e-mail [Debeerj@ukzn.ac.za](mailto:Debeerj@ukzn.ac.za) or the UKZN Biomedical Research Ethics Committee, contact details as follows:

**BIOMEDICAL RESEARCH ETHICS ADMINISTRATION**

Research Office, Westville Campus  
Govan Mbeki Building  
Private Bag X 54001  
Durban  
4000

KwaZulu-Natal, SOUTH AFRICA  
Tel: 27 31 2604769 - Fax: 27 31 2604609  
Email: [BREC@ukzn.ac](mailto:BREC@ukzn.ac)

## ANNEXURE C

### CONSENT FORM

3 St Clair Road  
Everton  
3610  
*date 2014*

### CONSENT FORM

I \_\_\_\_\_ have been informed about the study entitled 'Exploring the role of the intensive care nurse in the antimicrobial stewardship team at a private hospital in eThekweni, South Africa' by postgraduate student Joan Rout.

I understand the purpose and procedures of the study is to research the functioning of the antimicrobial stewardship team in ICU in this hospital and the role of the nurse within this team, by interviewing health care professionals who have daily responsibilities within this team. The general findings of the study will be made known to me once the study has been completed. I have been given an opportunity to ask questions about the study and have had answers to my satisfaction.

I understand that my participation in this study is voluntary and will be kept confidential. I understand that I may withdraw from the study at any stage and that I may contact the researcher, Joan Rout, or her supervisor Dr de Beer, should I require further information or clarification of any aspects of this study.

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers, then I may contact:

### **BIOMEDICAL RESEARCH ETHICS ADMINISTRATION**

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban

4000

KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604769 - Fax: 27 31 2604609

Email: [BREC@ukzn.ac.za](mailto:BREC@ukzn.ac.za)

SIGNATURE PARTICIPANT: \_\_\_\_\_

SIGNATURE RESEARCHER: \_\_\_\_\_

DATE: \_\_\_\_\_

Joan Rout

Cell: 083 7831008

e-mail: [joanrout@worldonline.co.za](mailto:joanrout@worldonline.co.za)

Dr de Beer

e-mail: [Debeerj@ukzn.ac.za](mailto:Debeerj@ukzn.ac.za);

## ANNEXURE D

### ETHICAL APPROVAL



05 August 2014

Mrs Joan Rout  
3 St Clair Road  
Everton  
3610  
[joanrout@worldonline.co.za](mailto:joanrout@worldonline.co.za)

Dear Mrs Rout

**PROTOCOL:** Exploring the role of the intensive care nurse in the antimicrobial stewardship team at a private hospital in eThekweni, South Africa: Degree Purposes (Masters). BREC REF: BE281/14.

#### EXPEDITED APPLICATION

A sub-committee of the Biomedical Research Ethics Committee has considered and noted your application received on 04 June 2014.

The study was provisionally approved pending appropriate responses to queries raised. Your responses received on 20 July 2014 to queries raised on 16 July 2014 have been noted by a sub-committee of the Biomedical Research Ethics Committee. The conditions have now been met and the study is given full ethics approval and may begin as from 05 August 2014.

This approval is valid for one year from **05 August 2014**. To ensure uninterrupted approval of this study beyond the approval expiry date, an application for recertification must be submitted to BREC on the appropriate BREC form 2-3 months before the expiry date.

Any amendments to this study, unless urgently required to ensure safety of participants, must be approved by BREC prior to implementation.

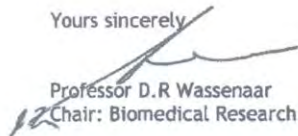
Your acceptance of this approval denotes your compliance with South African National Research Ethics Guidelines (2004), South African National Good Clinical Practice Guidelines (2006) (if applicable) and with UKZN BREC ethics requirements as contained in the UKZN BREC Terms of Reference and Standard Operating Procedures, all available at <http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx>.

BREC is registered with the South African National Health Research Ethics Council (REC-290408-009). BREC has US Office for Human Research Protections (OHRP) Federal-wide Assurance (FWA 678).

The sub-committee's decision will be **RATIFIED** by a full Committee at its meeting taking place on **09 September 2014**.

We wish you well with this study. We would appreciate receiving copies of all publications arising out of this study.

Yours sincerely

  
Professor D.R. Wassenaar  
Chair: Biomedical Research Ethics Committee

**Professor D Wassenaar (Chair)  
Biomedical Research Ethics Committee  
Westville Campus, Govan Mbeki Building**

Postal Address: Private Bag X54001, Durban, 4000, South Africa

Telephone: +27 (0)31 260 2384 Facsimile: +27 (0)31 260 4609 Email: [brec@ukzn.ac.za](mailto:brec@ukzn.ac.za)

Website: <http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx>

Founding Campuses: ■ Edgewood ■ Howard College ■ Medical School ■ Pietermaritzburg ■ Westville

INSPIRING GREATNESS



## 7.2.5 ANNEXURE E

### PERMISSION REQUEST LETTER TO RESEARCH SETTING

3 St Clair Road  
Everton  
3610  
*date 2014*

Mrs xxxxxxxxxxxx  
Hospital Manager  
xxxxxxx Hospital  
xxxxxxxxx Road

Letter of request for permission to conduct a research study

Joan Rout: Student no. 212542357

Dear Mrs xxxxxxxxxxxx

I would like to request permission from hospital management and the ICU unit manager, to conduct a research study into the role of the intensive care nurse within the antimicrobial stewardship team, in the general ICU in this hospital. This study is part of a postgraduate degree, Masters Nursing, under the supervision of Dr Jennifer de Beer at the School of Nursing, College of Health Sciences, at the University of KwaZulu-Natal, Durban.

This study would involve the voluntary participation of eight nurses, and eight doctors. All participation will be kept anonymous and contributions to the study will be confidential. Interviews will take place over a period of two weeks during a time that the participant finds convenient and does not have patient care. I would be grateful for the use of a private room in which to conduct interviews. The general findings of this study, once completed, will be made available to the participants, the ICU unit manager and the hospital.

The hospital has the right to withdraw permission for this study at any time during the course of the study. Please contact me or my supervisor, Dr de Beer, should you require further information or clarification of any aspects of this study.

Kind Regards  
Joan Rout

Joan Rout - Cell: 083 7831008  
e-mail: [joanrout@worldonline.co.za](mailto:joanrout@worldonline.co.za)

Dr de Beer  
e-mail: [Debeerj@ukzn.ac.za](mailto:Debeerj@ukzn.ac.za);

## ANNEXURE F

12 Pearson Road  
Everton 3610  
KwaZulu-Natal  
South Africa  
27 November 2015

University of KwaZulu-Natal

To whom it may concern

I confirm that I have assisted Joan Rout with language editing in her dissertation titled "Exploring the role of the intensive care nurse in the antimicrobial stewardship team at a private hospital in eThekweni, South Africa."

Yours faithfully



Elizabeth Rocke

## ANNEXURE G

### TRANSCRIPT PARTICIPANT TEN – Non nursing participant

Interview - Participant 10 (pseudonym: Bob)

*Interview commenced at 09h30*

#### Researcher

*I just want to explain a little bit about the study. Good morning and thanks for seeing me. This is a study into the management of... of antibiotics in the ICU and how we can develop the nurses' role in antibiotic stewardship. And as we work as a team in ICU, it's very important to get the viewpoints of all members of the team. So we're... I'm looking at management, nurses, microbiologists, pharmacists, anaesthetists, surgeons and physicians...*

#### Participant 10

Good. Ja.

#### Researcher

*It is going to be a short interview, hopefully about 15 minutes and I'm going to ask just a few, few very short questions, just to get a feel of what you want to say. It's an open interview, which means you can say whatever you want, whatever you like. And I would like you to choose a pseudonym, because... I will be the only person who knows that you are you, and not even my supervisor will know that you have said or contributed to the study in such a way. And I think that is important... for the... So if you would like to choose a pseudonym.*

#### Participant 10

Bob.

#### Researcher

*Okay. Morning, Bob. You have given your permission, your consent to the study and your consent to be recorded and...*

#### Participant 10

Yes, that's fine.

#### Researcher

*... and should you wish to withdraw your consent, you may do so at any time and every bit of contribution will be removed from each document and that is your choice and I'm fine with that. The first question I would like to ask you is... What does antibiotic... What does antimicrobial stewardship mean to you... in this hospital? How do you see it working... in our ICU...?*

#### Participant 10

First, use antibiotics where it's really indicated, or where there is a clear indication. Use the correct antibiotic if you... Depending on how well you understand the infection, start with a broad-spectrum initially and timeously get the right cultures available. In other words, tracheal aspirates... aspirations and MC&S's. And adjust antibiotics to that resistance profile as soon as you can. And stop antibiotics when... That, I would consider a good stewardship...



Researcher

*Yes, yes. A good definition... What are the challenges that face us today with antibiotics... briefly...?*

Participant 10

Well, first we use all the very broad-spectrum antibiotics throughout an admission, which would lead to resistance patterns that are typical in ICU's and with more... more vicious hospital acquired infections as a result. All these ESBL scenarios...

Researcher

*So do you see a stewardship programme as perhaps guiding prescribers to...*

Participant 10

Well, it's to protect your ICU. If you don't do this, you sit with a nasty ICU with infections that you don't want.

Researcher

*Yes, do you see any particular environmental issues here, in this ICU? Do we have any resident resistant bacteria that we are concerned about...? So would you prescribe... thinking okay... well this is an environment in which we have maybe such and such...*

Participant 10

Unfortunately I do... if I have someone in an ICU, that's there for longer than a week. The kind of infection that I expect is a very resistant bug which puts me immediately in the class of Carbapenems, as a result.

Researcher

*Yes, so what are we looking at there... a pseudomonas...?*

Participant 10

Pseudomonas is not big in the clientele that I'm seeing, but certainly... I have had some complicated sinusitis that has had *pseudomonas* in them.

Researcher

*Pseudomonas aeruginosa...?*

Participant 10

Yes... *pseudomonas aeruginosa*. And then you have your resistant *E. Coli*'s... more often than not. That, I'm concerned about antibiotic choice, hand washing techniques and infection control in general...

Researcher

*Yes, yes... that is a concern.*

Participant 10

Ja... as you well know... the hand wash is probably more important in this whole game... but then... so is the choice of antibiotic.

Researcher

*Yes... it is interesting.... because in the reading I have done... Whatever measures you put into place... it always comes back down to basic hygiene.*

Participant 10

Well, Ja. Source control... source control, early antibiotics and hand washing. It's amazing...

Researcher

*Yes, yes... Now who would you see as the members of... of the stewardship team in this hospital?*

Participant 10

That is the difficult one... because everyone prefers to function as an individual in this hospital. And the more qualified you are... the more individual you feel you should be. We don't really like peer review to start off with. Therefore, I suggest, get the people involved, as senior as you can. And get a whole team represented... If the team is too big, that might be troublesome as well... But at least, somebody from the surgical disciplines... somebody from internal medicine. It does not have to be a general physician only.

Researcher

*Ja.*

Participant 10

Get... get the nursing staff involved, especially the ICU nurses. We do have an infection control nurse that we should involve. The physios actually play a role as well, because, they more often than not are extracting the samples for you, like the induced sputums and so on. They would not necessarily have a say on the antibiotics per se, but just on infection control.

Researcher

*Yes.*

Participant 10

Well, that's as far as I can think should be on the team.

Researcher

*And the microbiologists...?*

Participant 10

And the microbiologists... Of course, one of the big labs should be involved with a microbiologist... that one can contact. Now, there you have to consider that there is loyalties to different labs supported by different specialists. I think we use [lab] here quite a lot, but there are certain [doctors] who only stick to [lab] and their microbiologists. So I suppose, if you can, you should have a microbiologist from both the labs that one can contact...

Researcher

*And how useful, would you think a pharmacist would be to...?*

Participant 10

... pharmacist... A pharmacist can inform us when somebody is on, say, Meronem for 24 days. So

they can provide us with background information. The pharmacist... we had a problem with intravenous [original] versus [generic]...

Researcher

Yes.

Participant 10

As you know about that case, the patient did really badly and we still thought if it was truly original [ ]; there would have been a chance. So yes, they do have to be on-board, but maybe not to police but to make sure that the right antibiotic is available at the right time.

Researcher

*Why would you think they would want to supply generics?*

Participant 10

In [this original] in particular, I think there could be a supply problem. But there's also financial factors that come into play and there's a drive from the medical aids to go as cheap as you can. But as you know when you are in ICU, that's the one place you don't want to do that. If you want to know, are you really treating the PCP... you want proper [original]. So, if you don't get a response you know that it's really a persistent bug and not a wrong drug.

Researcher

*Ja... No, no that's great and the part that you play in antibiotic management... you're a [ ]?*

Participant 10

Very small, actually... On top of these principles... every day... on your ward round, you should actually review the cultures that became available. You should keep records of how long lines have been there and you should be, on a daily basis, looking at the script. Just pick up the script and look which antibiotics are there... for how long they have been given. Have they been given? That's my part and I'm sort of playing policeman on the day-to-day management.

Researcher

Yes. Yes.

Participant 10

Not only to decide which drugs, but are they actually going down?

Researcher

*And... And how do you see the part that the intensive care nurse plays... in managing antibiotics...?*

Participant 10

Very important! Very important, they usually help me.... with keeping the book. They will tell me how long the lines have been in. They will alert me on... 'Listen this CVP's been in for two weeks and the wound site looks red...' In other words they would make sure I don't overlook the things, especially with long admitted patients. Also the obtaining of cultures, you know, a doctor... certain doctors, when they intubate, they take a... they take a tracheal aspirate on the spot. I like that practice but ultimately... it's the ICU nurse that makes sure it happens. And that it gets sent off. I mean, a good example, is the issue of urine. Many people are reluctant to actually take the sample, for I don't

know which reasons... but there are logistical issues and I really rely on a nurse to get me a proper urine sample, for instance. Blood cultures as well, we are relying more on the labs, and so.

Researcher

*... to advise...?*

Participant 10

Ja... but my nurses are very important to get the actual samples. And I'm not a [ ], but wound sepsis and control... Obviously the nurse plays a cardinal role there... and their advice I often depend upon, whether we need to just change a dressing or send for a formal debridement. But I'm not a [ ], I suppose they make also use of the nurse to help them.

Researcher

*Thank you. Ja. Can you make any suggestions where you think that we can improve on... on the role that the nurse plays at the moment... anything that can develop that role. Make her more useful in the management of antibiotics...?*

Participant 10

Well, communication is very important. You know, a nurse is an important part of the ICU and they are there the whole day. They are not just there on ward rounds. But very important, the handover that happens between shift change but also between the doctors... I might not be aware that Dr number one, that was there half an hour before me, may have actually written up a certain antibiotic after he spoke to a microbiologist. And that... If the nurse doesn't tell me that... I may miss that.

Researcher

*Yes.*

Participant 10

So for communication they are important, for source control they are important, for making sure the actual antibiotic is given they are important... Because, let's be honest, they do the actual work.

Researcher

*So you are looking at clinical skills... in making sure those clinical skills are good. You are looking at administrative skills... of communication... of actually being able to make sure that things get done...?*

Participant 10

Right... And then of course, the general precautions.. They are the ones who are in contact with the patient the most, so the whole thing of hand washing and blue aprons and mask if it needs masks. The other day, I noticed, there is not really a barrier for the eyes, when we do certain procedures. Like, for instance, if a patient vomits, you can actually get splashes on the face. So, I suppose it doesn't have much to do with the actual antibiotic, but still universal precautions are very important... and they are the ones doing it. Fortunately they work with one patient only, but I can imagine if you quickly have to do something for the patient next door, you actually need to unscrub, unglove, wash and go to the next one. And that is important because that is how antibiotic resistance spreads as well. And the example there would be *Clostridium difficile*. When you're cleaning excrement, that patient might be asymptomatic but might have the bug, and... if you don't wash properly between patients, the patient on the next bed can get it.

Researcher

*Have you noticed... have you... can you recall incidences that you've have seen a bug travel across the unit.*

Participant 10

Well, I'm not actually involved in too many patients in ICU. I only ever sit with one at a time, so it is difficult for me to say... if it jumped actually for my neighbour or if it's a new infection. That's a tough one. But certainly there have been cases but I can't name them...

Researcher

*Yes... yes. What do you think are some of the barriers to developing the nurses' role...? Where do you think it's a struggle?*

Participant 10

Traditional doctor /nurse roles... You know... the nurse came a long way. In the old days, probably they... their education was a basic one. That, in the past decade or two it became quite a science, and there is quite an overlap between doctor and nurse, even in the teaching schools. So there... there is going to be a new paradigm shift on basically which role they are going to play in management and in advice.

Researcher

*Do you think that's an awkward shift at the moment?*

Participant 10

It's something, like everything in life. It is something to get used to. We have a similar situation now with physician assistants that they want to employ in the Department of Health. With what exactly... what role is that person is going to play? And I think that the personality of the individuals is going to determine exactly what role... Some... some ladies in the nursing profession are just a bit more forthcoming than others... Also you can't expect a generic response... there are going to be some nurses that are going to be more productive. I personally welcome that.

Researcher

*Yes... Can you link this to educational... background?*

Participant 10

You... you can only be as good as your mentor, I used to say... If you have a mentor that's progressive and forward thinking, I think your student will be as well.

Researcher

*Yes... yes... because we... In ICU... the nurses all wear the same scrubs, so it may be difficult to see that one's a registered nurse, that one's an enrolled nurse. That one is an ICU trained nurse, that is an ICU trained nurse with many years of experience... You know... it's difficult.*

Participant 10

I have to get used to the personalities... you know. I am, when I work with people... that is why I kind of prefer to work with the same team all the time, you get a feel for what are the limitations of the different people. And that's why I make an effort to know everyone by name because I make associations. So I might not know the... their... their specific rank... but I've got a very good previous

experience of this one I can leave to interfere with the ventilator... and this one rather not... And so on... So that's why I know, if you work in a team, you get a good feel for each other and, I think, the nurses gets a good feel for the doctor as well. Ja, it's, in the end... team work.

Researcher

*... and building up a relationship and understanding and knowing that your communications with that particular person is going to be good communication... You are going to get the information that you need about the patient?*

Participant 10

Well indeed.

Researcher

*Ja... that's... Okay... is there anything else that you'd like to add?*

Participant 10

Well, as far as stewardship is concerned... all I can say is... it has potential for making an ICU better ... but unfortunately.... one can also meet with antagonism. Simply because people feel threatened about their skill and liberty and they don't like any criticism. And, so... if one implements it wisely... I think there is huge potential. I personally don't have that kind of issue, but there are clinicians that don't like it... or they don't like being told.

Researcher

*You mean, for instance... the pharmacy department being prescriptive and saying you may only use this in such and such a situation. Is that what you mean?*

Participant 10

Ja... You know... some clinicians don't like the word... shouldn't use. And, I don't have that... My attitude is if somebody can give me useful advice... I'll actually make use of it. I will use it as... to improve my service.

Researcher

*Have you found that there is that sort of prescriptive behaviour where someone may say; 'well actually you shouldn't be doing this'.*

Participant 10

Well, Ja, it depends on who it's coming from... But some people can really jumble the words. They just look at a piece of paper and not at the patient. And, for that I would actually just invite healthy debate and discussion and then let's come to a conclusion.

Researcher

Yes.

Participant 10

So... don't let a patient fall between the cracks, in other words.

Researcher

Yes.

Participant 10

That's how I see it.

Researcher

*Yes... Well, thank you Bob.*

Participant 10

Very nice to meet you, Joan.

Researcher

*I appreciate it.... thank you.*

*Interview stopped at 09h50*

Added at accuracy check by Participant 10

*Principles of antimicrobial stewardship*

*a – clarify indication*

*b – broad spectrum initially until cultures dictate*

*c – correct duration*

*d – understand your infection*